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Soap for the Silk Dyer

Special Requirements of the Silk Trade—Careless Washing Makes Good Soap Necessary—Brown Olive Oil Soap—A Trouble Case

By FRED GROVE-PALMER, A.I.C.

A PROTRACTED study of the needs and requirements of the silk industry from inside the mill has brought about the examination of a large number of samples of various makes of soap, and in the great majority of cases those that have been submitted have proved to be totally unsuited for the purposes for which they were offered.

In practically all instances it has been established that a soap which is made from a hard fat or oil is of no use to the silk dyer, and furthermore that any soap which is so constituted that a 1% solution in water will solidify and set to a jelly when it cools must also be ruled out if it is a question of using it for the boiling-off or degumming of silk. Above all, a soap which is made with resin should be most carefully avoided. Resin is only put in in order to cheapen soap by adding an inexpensive adulterant, and though this may not be a matter of great moment when it is to be used for the washing of floors, when dealing with a precious substance such as silk it is a positive danger because it has the effect of producing a most unpleasant yellowish tinge upon the delicate fiber that cannot be removed without risk of injuring the luster and handle.

A soap that can be used for boiling-off silk will also be good in the dyehouse, for the circumstances are more or less on a par, and after long research three varieties were found which gave excellent results in all the various stages of milling and finishing the woven fabrics.

The chief of these, and one of which many hundreds of tons have been used with few, if any, complaints from the mill, is a pure oil soap. An average analysis of this shows the following figures:

Fatty anhydrides	65% or more
Combined alkali	8%
Free alkali .....(less than)	0.3%
Water	23%

The low content of free alkali is a very important point in the choice of a soap for use in the latter stages of silk finishing, and experience has shown that the figure given, about 0.3%, should be regarded as a maximum, and any consignment in which there is found to be a greater amount than that should be returned to the consigners with the utmost dispatch. It is most necessary that the manufacturer who is preparing the soap for the purposes of the silk industry should not be allowed the least license in this respect. The reason for exercising so much caution in this direction is that if there is much free alkali present in the boiling soap bath there is considerable danger of spoiling the luster of the silk, and in many cases of producing a tenderness in the fiber that will so reduce the value of the broadsilks that there is a great loss to the factory. The fat used in the pure oil soap is of a semi-solid nature, and the setting to a jelly which is an undesirable feature of many soaps does not take place.

The Human Element a Reason for Care

It is sometimes asked why there is so much stress laid upon these points when it is well known that all the soap is washed out of the fabric after it has been degummed. The reason is very largely because of the fallibility of the human being: in the hustle and worry of a busy factory when everyone is clamoring for greater output and the dyers are being pressed to deliver the goods more rapidly, there is always a possibility that the rinsing of the materials may not be done with that thoroughness which is so desirable at all times, and which it might get if there were ample time to be devoted to every detail of the process. Because of this failing, the use of a soap which shows any inclination to set up when it gets cool is undesirable from the fact that it may not be entirely removed from the fiber; when this happens it is sure that "soap marks" will develop when the broadsilks are sent to the weighting department, if not also in the dyehouse. As the chief very probably said, this should never happen in a properly worked mill, but it does, and it is as well to take all possible precautions to avoid trouble from sources of this kind.

A brand of soap that has been found to be very suit-

able for the silk dyer is that known as "Monopol"; this is a patented name originally, but seems to be applied to a class of soaps that is prepared from a soluble oil, made from sulphonated linseed or castor oil. On analysis this shows:

Fatty Anhydride	65 to 70%
Combined Alkali	3%
Free Alkali	nil
Water	12 to 15%

Whether the brand that was used belonged to the original makers or was the output of another firm, we had no means of telling as it was purchased through an agent who did not state the source of the supply. It was costly to use and the quantity available was very limited, which precluded the possibility of making very extensive use of it, greatly to the disappointment of the dyers, who liked it exceedingly.

The best soap of all that has been tried for this purpose is undoubtedly that known as Marseilles soap, or green olive oil soap. It is made principally on the shores of the Mediterranean and is shipped from the port in the south of France, from which it derives its name, in large quantities; it may be purchased also from Spanish and Italian makers, and there is at least one domestic source of supply which is of excellent quality. The following shows a typical analysis of such a soap:

Fatty Anhydride	60 to 63%
Combined Alkali	7%
Free alkali (under)	0.3%
Water	26 to 30%

The good qualities of Marseilles soap for use in the silk mill are almost historical; the majority of the older writers on the subject mention no other; experience has proven the correctness of their verdict, and, as a rule, the price is such as makes it a very attractive proposition. The fat is always liquid because it is made from the finally extracted portion or "foots" of the olives after all the various grades have been squeezed out for purposes of food. It is usual to employ the olive oil foots alone; it is removed from the "press-cake" and also from the broken kernels in an extraction machine by means of some such volatile solvents as petroleum ether or carbon disulphide, which are afterwards evaporated and used over again. The soap has a very pleasing green color that is derived from the chlorophyll in the fruit and gives it an appearance of being good enough to eat. It was soon found that the girls in the mill had discovered the valuable emollient properties of the new soap which assisted them to "keep that schoolgirl complexion." It is possible to procure other kinds in which the green coloration is not found, and which on repeated trials proved to be equally good for the silk, but they were not thought so well of by the dyers, simply because they did not look so pleasant as the green variety.

This is a point to which soap manufacturers might devote a little attention, for, as in a great number of materials, the appearance of the substance exerts a considerable influence on the decision as to its quality. It is undoubted that the brown kind of soap did not look so pretty and appetizing as the green, and the decision of the dyehouse was against it for that reason, though it was suggested that there were others.

Brown Olive Oil Soap

The brown olive oil soap is prepared from a mixture of the olive oil foots with "red oils"; this is the commercial name for the fat which the chemical technologist describes as "crude oleic acid." It arises in the manufacture of stearine, for which the oil, often palm oil, is cooked up with lime, and the solid mass that is filtered off, consisting of fatty salts of calcium (it is spoken of as "rock") is heated in contact with weak sulphuric acid. In this way, the calcium is precipitated as calcium sulphate, and the fatty acids are released, being run into molds and allowed to solidify. The solid cakes are then placed in a hydraulic press and the liquid portions squeezed out; this is the "red oil" which is used to a large extent in the soap industry.

It will have been noticed that the foregoing remarks concerning the use of soaps of various kinds in silk manufacturing have been devoted entirely to those processes which take place after the yarn has left the throwsters, being applicable to the boiling-off and dyeing either of the yarn or the broadsilks. But when we come to consider the preliminary treatment of the raw silk, which also requires soap, another set of conditions prevails which calls for attention from a different angle; and though green olive soap has been found in actual practice to give perfectly good results, it has been thought expedient to permit the "soaping department" to continue in the use of the make of soap that has given them satisfaction from time immemorial. This is one of the curd soaps, and a typical analysis may be as follows:

Fatty Anhydride	66.6%
Combined Alkali	7.5%
Free Alkali	0.5%
Water	23.8%

It will be seen at once that the alkalinity is high, and for the later processes the use of such a soap would be impossible, without grave risk to the luster and even the strength of the fiber. But in the soaking the temperature is always kept down, and therefore the risk is minimized, but, as will be noted shortly, this is a matter that needs very careful supervision.

It will also be argued that as so great a feature has been made of using a soap with a liquid fat, curd soap made from solid tallow cannot be suitable, but this is where the difference of purpose calls for a difference in material used. In boiling-off the object is to remove the sericin or silk-gum entirely and leave only the fibroin or silk substance, but in the soaking process this is not desirable; what is aimed at is the softening of the sericin

to some extent, and while leaving it still in its original position on the fiber to add fatty matter to the filament in order that it may be sufficiently lubricated to pass readily and without breakage through the various stages of manufacture such as throwing, winding, warping and weaving. For this reason hard tallow soap and other non-volatile greases are put into the soaking liquor with the intention of depositing on the fiber enough lubricating material to permit of the silk running easily in the machines.

Referring back to the question of the larger amount of free alkali that is shown in the analysis of curd soap: In the course of the preparation of a soap of this nature the alkali is not so completely separated from the soap as it is in other kinds, and it can be readily understood that it is only necessary for a trifling error to take place in the factory to so increase this undesirable component as to render the soap totally unfit for use in a silk mill. Such an occurrence as this actually took place.

A Troublesome Case Involving Poor Soap

A batch of silk which had been treated by the soaking department in the normal manner was found to be giving trouble in the winding room and the matter called for investigation; so far as could be ascertained, there had been no irregularity in any respect; the silk itself was part of a shipment which had not hitherto caused any difficulty and all the ingredients of the soaking bath had been tested and passed as being O. K. by the laboratory. Everything seemed to be in good order, and the cause of the trouble looked like being one of those "mysteries" that occur in all mills. However, someone announced that a fresh box of soap had been opened for the purpose of soaking this particular batch, and this box was examined. When the consignment of soap had arrived the usual percentage of boxes had been opened for test and had been found in good order, but this particular box was filled with soap that was covered all over with crystallized soda; further investigation showed several more boxes in the same condition. These were checked up and found to contain considerably more free alkali than could possibly be allowed for use with silk. The appearance of the soap should have warned the operatives against its use, but it just happened that it was a new hand who did not know anything more than just how to weigh out the required quantity, and so it had got past without being seen and caused the damage. The manufacturers of the soap were informed and gave a perfectly unsatisfactory explanation of the business; it was obvious that there had been some breakdown in their routine or they had been trying to overwork their plant. The very grave importance of the matter was pointed out to them and the difficulty was finally smoothed over, but it was necessary to give urgent instructions to the soakers to be on the lookout at all times in case there should be a recurrence of the fault.

It will be gathered generally from these remarks that the soap question in a silk mill is one of extreme importance; it not only demands the greatest care and regularity on the part of the manufacturer, but it also requires unremitting attention from the consumer.

NEW COURSES PLANNED FOR CLEMSON TEXTILE SCHOOL

The rapid growth of the textile manufacturing industry of the South has brought an increasing pressure to bear on the section's educational facilities. To meet this condition more adequately the Textile School at Clemson College, South Carolina, will offer new courses along specialized phases of textile processing when the school opens next September.

One of these will be a full four-year course in Textile Chemistry and Dyeing. It will include the four years of work in the chemistry department of the college with special work in junior and senior years in the Textile Chemistry and Dyeing Department of the Textile School under Professor Mullin. Opportunity will also be given for special work in Physical and Colloid Chemistry, both of which play an important role in modern textile industry. This course leads to the B.S. degree and is planned to meet the needs of the bleaching, dyeing and finishing industry.

Because of the present wide interest in rayon, the Textile School will offer an optional course next semester in the Chemistry of Cellulose, which will be followed by a course on the Chemistry of the Rayons.

Besides the regular course in textile engineering, many opportunities for specialization in the various phases of textile manufacturing will also be offered, such as special work in textile chemistry and dyeing, yarn manufacture, weaving and design, general textile manufacturing, industrial education, etc. Special short courses in a combination of subjects fitting the special needs of the student will be available.

Professor Mullin is now in Europe studying textile education. He reports many things of interest, and has already obtained valuable information and material to be used in enlarging and further developing the Textile School at Clemson College.

NEW ANTHRENE ORANGE PASTE

A new fast color developed by the Newport Chemical Works, Inc., has been placed on the market under the trade name of Anthrene Orange RC Paste. It is suitable for dyeing cotton and rayon in all stages of manufacture. In light-fastness it is somewhat superior to the Anthrene Golden Orange brands, according to the announcement, and in addition possesses all the characteristic fastness properties of vat dyestuffs. It is said to be readily reduced and to level well. In addition to its use as a self-color for the production of brilliant orange shades, it is adapted for use in combination with other vat colors of similar properties for the production of tan and brown shades. It is not dischargeable.

The Proper Bleaching of Silk and Rayon

The Most Economic Method Involves Use of Large Washer—Bleaching and Cross-Dyeing—Singeing and Chemicking—The Piler Employed—Competition of the Rayons—Identify Your Rayons

By THOMAS F. HUGHES

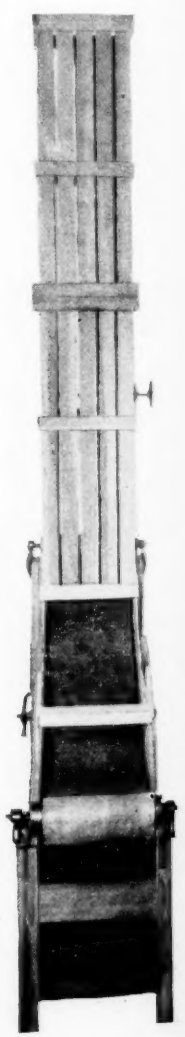
THE bleaching of silk piece-goods so as to get production at the lowest possible cost has always been the aim of the finisher. There are several ways of bleaching silk: in kiers lined with lead or other metals, in wooden tubs with a centrifugal pump for circulation, and other methods. The writer has had several years' experience in the bleaching of silk goods, and finds that the most economic way to get production along with a pure white is by the use of a large slack washer 12 feet long, with a tank underneath, divided into three compartments, each compartment holding 2,000 yards of silk goods. There are two wooden squeeze rolls located just above the tank, and a reel to take care of the goods after they enter the squeeze rolls. The rolls are lapped with cloth, which is replaced from time to time; any kind of heavy cotton cloth may be used.

After the goods are wet-out they are entered into a soap machine made along the lines of the above machine and soaped for two hours in a good chip soap. The soap is then run off and the goods are washed in warm water for half an hour. They are then taken from the soap machine and reeled into boxes when they go to the peroxide machine. In this machine the peroxide is dissolved before entering the goods and the bath is made up as follows: For 6,000 yards, the capacity of the machine, fill the tank half full of water at 190° F. and add 20 pounds peroxide, 26 pounds sulphuric acid, and after this has dissolved, test with litmus paper. If the bath is on the alkali or acid side, add one or the other to make the bath natural. Then 4 quarts silicate of soda and start the goods into the machine, 2,000 yards to each compartment. It will save time if each 2,000 yards are kept separated both in the soaping and peroxide, as then you can load the machines with three strings at a time.

Bleaching and Cross-Dyeing

After the machines are loaded the ends are tied together, the machine started, and the goods in each compartment allowed to run round for three hours. When the silk comes out to the desired white, the liquor is run off and the goods are washed by running in cold water and having an overflow. Goods containing cotton, silk, rayon and Celanese may be bleached in the above manner and cross-dyed in the same machines, producing with the different dyes four different shades.

Goods bleached as above are free from damages, frays or bias prices, as the goods are run slack throughout the process. In most plants the goods are opened by hand, the goods going over a reel and into boxes, and are then dried in loop dryers or in hot chambers where they are hung on poles. Some classes of goods may dry well on cans or tenter frames, but the goods that go for a soft finish have a harsh feel when dried this way. The bleaching of rayon silk is much different than that carried on in the bleaching of real silk, and



Piler adapted for use with silk, rayon or any other kind of fabric treated in the bleach house.

Courtesy Textile Finishing Mch. Co.

as some of the chemicals used in bleaching cotton are used in bleaching rayon, one in particular should never be used, and that is caustic soda. Rayon goods should never come in contact with a caustic alkali.

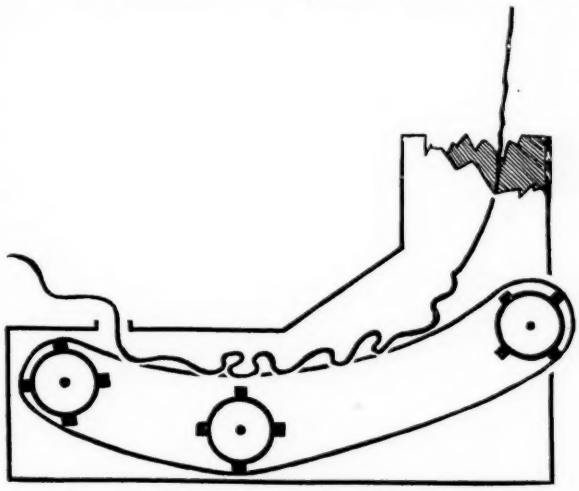
If goods are to be singed they are taken from the singe room and washed into a kier, filling to about two feet from the top. The bottom valve is then closed and cold water is run in until the cloth floats. Fifteen pounds of a good neutral chip soap is tied up in a light-weight cloth bag and entered into the kier. The rayon is boiled in the open kier (that is, with the cover off) for ten hours. After two hours the steam is cut down to the point where the liquor is just kept in circulation. After ten hours the kier is blown down and the goods washed off. The material is now ready for the continuous process, and for this six washers are required.

Four large washers and two small ones are necessary for chemicking and souring. From the kier the goods go to the first washer, which contains an emulsion of 300 gallons of water, 16 pounds tetrakierol, 5 pounds bisulphite of soda, and 5 pounds silicate of soda (tetrakierol is a sulphonated oil containing "verapol," an imported bleaching agent). This washer has a perforated brass steam pipe in the bottom, and the bath should stand at a temperature of 175° F. at all times. After leaving this machine, the cloth enters a J box, then is taken to the next washer, which contains lukewarm water, with fresh water running in at the delivery end, and out at an overflow at the entering end. From this washer the cloth enters another J box, and then goes to the chemic machine where it is chemicked at 2° Tw. slightly warm.

The Piler Used

The chemicked goods are run into a piler constructed like that in the accompanying sketch. This piler can be made of any size, according to conditions, and the tower is generally built from 30 to 50 feet high. The lower part consists of three large modern rolls running in ball bearings, and an endless rubber belt or conveyer around the rolls. This works automatically; as the cloth piles up the weight of the goods causes the belt to turn, sending the cloth forward.

The goods are left in this piler until fully developed, the first two mentioned machines still running until it is nearly full, when the goods are started through the next washer. This washer is to wash the chemic from the goods and should have a good head of water and an overflow. From this washer the cloth is run into another J box and then to the souring machine, where it is treated with sulphur dioxide, sulphuric acid, hydrochloric acid, or bisulphide of soda. The writer prefers the use of sulphuric acid at 1° Tw., as it brightens up the goods. After this souring the goods are ready for the final wash, and this is carried on in a washer with 18 or 20 strands and with a good head of water and an overflow, as this being the last wash the rayon goods must be free from acid before drying. From this washer the goods go to the white bins. This process can be operated by two men and a boy, or, if a piling machine is used over the bins, two men can operate the machines from switchboards.



Cross-Section of Piling Machine Recently Developed for Bleacheries

Competition of Rayon

The emulsion in the first washer will last for a 10-hour day. It may then run off and a new mixture made up. Goods bleached by the above process have a very good feel and body with no damaged or frayed pieces, since the cloth is always run slack, and colored rayon goods are always free from mark-offs.

Some of the rayons differ from other textiles in qualities such, for example, as their affinity for dyes being quite different from any other fiber hitherto produced. Rayon has also replaced lines of crepe de Chine and georgette, but it now appears that there has been little warrant for making the attempt to find a place for this fiber in some of the garments that formerly were made of other materials. Also, it is claimed that in a good many cases the reason for substituting rayon on account of its cheaper cost has been unfounded, and that garments can be made, not only more satisfactory, but more cheaply of georgette or crepe, and their suitability for the purposes intended is greater by far.

In the narrow fabric field rayon has reached new heights of importance lately, and it appears in a large percentage of braids, edgings, bindings and fringes. It is also a leading material in the making of many elastic fabrics, such as the narrow elastic webbing used for garters and other purposes. Rayon's use in drapery materials has become a leading feature in that field. In heavy brocaded effects for formal hangings,

as well as in light transparent curtain materials, rayon lends its bright decorative effect to homes all over the country.

The recent vogue for colored bedspreads has given rayon another opportunity which mill men have not wasted, and jacquard pattern effects in plain and crinkle bed coverings are now one of the most important items in the bedding departments of the nation's dry goods stores. The use of rayon fabrics for linings hold great potentialities, which are just beginning to be developed. In the men's clothing field the use of rayon instead of mohair has been attempted without conclusive result as yet.

Know Your Rayon

The rayon dyer should know what kind of rayon he is dyeing and processing, since the different types possess properties which, when understood, materially assist in reducing the uncertainties in processing. The following brief tests will enable a person to distinguish the various types of rayon that may come to their attention.

Cellulose Acetate Rayon.—Cellulose acetate rayon may be distinguished from other types by taking a few fibers and twisting them into a wad, which is placed on a hard surface, such as marble or tile, and a lighted taper is slowly brought toward it. As the flame nears, the fiber will melt or fuse and burn slower than the other types. The charred remains will appear as a hard lump, which slightly resists crushing between the fingers. Regenerated cellulose, such as viscose, cuprammonium and nitrocellulose burns like cotton, leaving no odor, and scarcely any ash.

Nitrocellulose Rayon.—Nitrocellulose rayon is distinguished from the viscose and cuprammonium rayons by its reaction to diphenylamine and concentrated sulphuric acid. One per cent of diphenylamine is dissolved in concentrated sulphuric acid. When the yarn in question is moistened with this solution the nitrocellulose filaments turn a deep blue color. They dissolve readily and make a blue solution. The viscose and cuprammonium dissolve but do not turn blue.

When rayon skeins are to be colored, the preparation for dyeing is very simple. All that is necessary is a simple wetting-out to give all the fibers uniform absorption. This wetting-out process can be hastened and yarn made more absorbant, and the subsequent dyeing will be quicker by the addition of some assistant to the bath.

The H. W. Butterworth Company, of Philadelphia, will shortly make an announcement regarding a new processing machine that, it is claimed, will shorten operating time from fifteen hours to one hour. Details will appear in an early issue of the Reporter.

STARCHES TESTED AT CAROLINA TEXTILE SCHOOL

The Textile School of North Carolina State College has completed a series of tests on starches sent to the college by the mills of North Carolina.

The tests were conducted by students in the Textile School and Dr. O. H. Browne, under the supervision of A. H. Grimshaw, Associate Professor of Dyeing. Sixty-three samples were examined, using the apparatus of the new research laboratory recently equipped for this particular type of work. An electric oven was used for moisture tests. Microscopic examination was made with microscopes that were equipped with Camera Lucida for drawing pictures of the samples, other microscopes being equipped with Students' Demonstrating Ocular, which enables the teacher to point out clearly the characteristic properties of the various starches. A photographic camera equipped with a Silverman Illuminator was used to take pictures of these characteristic properties, or any other peculiarities.

Pasting point tests and soluble matter tests were made, and in order to reduce the time of these tests electric stirrers and Babcock testers were used. Ash, grit, viscosity, color and other tests were made. The results of these tests will be published and distributed.

DETERIORATION OF TEXTILES STUDIED

One of the difficult problems encountered by textile chemists is the determination of causes of deterioration in fabrics and yarns, according to the United States Bureau of Standards. The Bureau's studies have resulted in methods for the analysis of deteriorated cotton fabric for various destructive agents. A procedure has been formulated by means of which it is possible to analyze fabrics for total silica, iron, aluminum, sulphate, soluble chlorides and combined chlorides.

Accumulative deterioration often occurs in laundered materials, and the destructive material is almost entirely removed by the laundry process. The problem then is the detection, identification and estimation of chemicals of microscopic size.

Research at the Mellon Institute for possible moth repelling chemicals has led to the discovery that the cinchona alkaloids and their derivatives are effective moth repellents. As they are soluble in a variety of vehicles it is possible to use one or more of these substances under almost any condition in the production and use of materials susceptible to moth attack. A process in which one of the cinchona alkaloids is employed has been in successful use for more than a year in the American dry-cleaning industry. Processes utilizing the cinchona alkaloids are adaptable to many other industries in which the clothes-moth is a destructive nuisance. The products are inodorous and adhere to the materials to which they are applied.

Impressions of the I. G. Plants of Europe

The Bayer Laboratories at Leverkusen—Fading Tests and Apparatus—The M. L. B. Plant at Hoechst—Color Measurement Apparatus—The Naphthol Plant at Offenbach—The Badische Plant—Wetting-Out Agents

By Charles E. Mullin, M.Sc., F.C.S., F.A.I.C., F.T.I.
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WE have all heard a great deal about the wonderful I. G. plants in Europe, but no one can really imagine just how large, complicated and interesting one of these plants is until he has been over it himself. In fact, to go over one of the larger plants completely would undoubtedly require several weeks of good hard walking and stair climbing. To many chemists the most interesting part of the plant is its heart, the laboratories. Probably all of you have heard about the Bayer Company's laboratories at Leverkusen, but it is just about as difficult to imagine these laboratories and the great variety of their work as it is to picture mentally the rest of the plant.

Leverkusen is located very near to Cologne, and naturally that was the first one of the I. G. plants for me to visit. As you all know, the Bayer Company manufacture a little bit of everything, from headache cure (Aspirin) to mothproofing (Eulan), including all kinds and varieties of dyestuffs, special chemicals, etc. Each of these products requires special control methods, special chemists, laboratories, etc., for its manufacturing control, standardization, testing, etc. Besides this, there is the necessity of trying out each of these products for new uses or for the special use of some particular trade or customer. Add to this the search for new products, improvements in present products, new raw materials or sources of supply, control of shipments, etc., and you may begin to believe that the I. G. has some laboratories at each of the large works, the Bayer plant at Leverkusen included.

It is useless to try to describe either the plant, laboratories or products of any plant of the size of the Bayer Company in any one issue of a journal. Many of the I. G. plants extend several miles in each direction, covering many square miles of ground with large and small buildings of all sizes, shapes and uses. Simply a maze of buildings, pipe lines, railways, chimneys, organic odors and colors, etc. Everywhere you look there is something to interest the chemist. They make synthetic gems and methanol, synthetic dyes and tanning agents, pharmaceuticals, photographic and other fine chemicals, rayons, cellophane, wetting-out agents, intermediates, special mordants, resins, and even mine coal, etc. As now arranged in the I. G., each plant specializes upon one or more lines of products instead of making them all.

One experiment at the Bayer plant that was of particular interest to me was upon the fading of colors in artificial light. When using a light of very high candle-power—say, from 1,000 to 4,000 c.p.—the heating of the goods is usually very great, unless some special means of cooling is used. Here the samples were mounted on the inside of a roto revolving at about 1,000 revolutions per minute. The diameter of the rotor was about 30 inches and in the center was a 4,000-c.p. incandescent lamp. One day's exposure to this lamp is equal to about three days in sunlight. It would be interesting to know if this method offers any advantages over the Fade-Ometer and other methods that have been developed in America, particularly at the Bureau of Standards under Mr. Appel.

Of course, there were a million other things of interest at the Bayer plant, but if there had been only one thing I could have described it much better. It is like trying to describe a ten-ring circus in ten words. You can't see it all at once, and after it is all over you can't tell much about what you have seen. I am particularly indebted to M. A. Stempel and Friedrick Hilker for courtesies shown me at the Bayer plant.

The M. L. B. Plant at Hoechst

At Frankfort I had previously arranged to meet my very good friend A. R. Andreae, ex-chief of New York sales for the General Dyestuffs Corporation, who is now located at the Hoechst plant. Sure enough, he came right to the hotel for me in a big car (and these are much more rare in Europe than in America) and escorted me to the plant in style. While neither of us has been away from the States for a very long time, it is long enough that we got a lot of pleasure out of talking over many of our very good mutual friends. Maybe you were one of them? At this plant I met Director Dr. Wilfred Greif, Dr. E. Hereen Crueck, Dr. Rudolph Lindner, all of whom are well known in America in connection with sales, as well as Dr. Rittinghausen, director of the laboratories. All co-operated to make my visit a pleasant and profitable one.

Just as in the case of the Leverkusen plant, the Hoechst plant is also equipped with very extensive laboratories for every purpose. Of course, here, as elsewhere, there were many things of interest, including an apparatus for the application of Indigo to samples of piece goods in the laboratory.

At Hoechst I also had the pleasure of meeting Dr.

*This is the first of a series of brief descriptions of some, but not all, of the textile and dyestuff plants, schools, etc., visited in Europe, as well as some of the specially interesting products and processes found in these plants. Where the consent of the management of the plant or school was not obtained, no mention of the visit will be made, and in no case will any details of the process be given.

E. Herzog. The name of Herzog appears rather common among the scientists of Europe. Already I had met Prof. Dr. R. O. Herzog, of Berlin, and Prof. Dr. A. Herzog, of Dresden, of whom I will tell you more later. But Dr. E. Herzog had some very interesting things to tell and show me regarding the measurement and comparison of colors, such as in fading, etc.

At the time I visited him he was experimenting with a new Zeiss instrument that looks similar to a Du Bosque colorimeter, and which may, among other things, be used in about the same way as this colorimeter. It may also, however, be used for the measurement and comparison of color on solid materials, such as textiles. Besides an apparatus for accurately regulating the amount of light reflected from one sample, it is arranged with a number of color screens, both the Ostwald and other systems, so that numerical measurements of each color reading are possible. By means of the large variety of accessories supplied with this instrument it has a wide range of uses, largely in connection with the measurement of color, etc. According to Dr. Herzog, the instrument itself is very satisfactory for certain work, but for some types of measurements it is very difficult to obtain the uniformity and intensity of illumination desired.

The Naphthol Plant at Offenbach a.M.

On account of the great interest in the Naphthol AS series of colors in America, Mr. Andreae very kindly arranged for me to visit the I. G. plant at Offenbach, where all of the Naphthol AS series are now prepared. Here I met the many experts in the manufacture and application of the naphthols, including Prof. Dr. Th. Schmidt.

The naphthols are finding an ever-increasing usage in the textile industry all over the world, and the range of colors and shades available is being constantly increased. At this plant I saw the new blue, produced from Naphthol AS-RS, I believe, which is stated to be fast to kier boiling and the hypochlorite bleach, and therefore suitable for use as toweling stripe effects. I saw also samples of the new red which is stated to be faster to kier boiling, etc., than Turkey Red.

The application laboratories of this plant were particularly interesting in that machines were available for applying the naphthols to cotton in all stages of manufacture, from raw stock and yarn in hanks, on *cheeses or beams*, to the woven piece goods. Needless to say, this equipment varied quite widely, according to the character of the goods to be dyed. The beam dyeing and other package dyeing apparatus was particularly interesting.

The Badische Plant and Wetting-Out Agents

Through the courtesy of Prof. Dr. Meyer, Dr. Carl Immerheiser and Dr. Resseler, I had the pleasure of visiting the Badische plant at Ludwigshafen. This plant is the home of the famous Indanthrenes and many other well-known dyestuffs. While it is probably the largest of the I. G. plants, employing about 30,000 men, I believe, as a dye plant it resembles most of the others. One dye plant has things arranged in one way, while the next plant may have them in the same on a slightly different arrangement; but, on the whole, one azo dye plant resembles another very closely. With vat dyes, etc., there is usually more difference in apparatus and arrangement. Of course, all of them are of interest to every chemist, especially a textile chemist.

At each I. G. plant visited there were some one or more things of particular interest, and at the Badische plant this proved to be some of the new wetting-out agents and similar products about which we are hearing so much recently. Just before I left the States I learned that our old friend George Alpers is specializing on these products; if anybody is interested in learning more about them he can give you the latest "dope."

As you all know, there is a wide variety of these wetting agents, but one that was of particular interest to me for mercerizing was Prastabitol BM. This product is added to the caustic soda mercerizing bath in the proportion of about 5 grams per liter, and avoids the necessity of wetting-out the yarn before it enters the bath. From the laboratory demonstrations it appears to work very nicely, and it should be of interest in America, where things are speeded up to the limit in order to keep down costs.

You have all heard of Nekal, and some of you have played with it to some extent, but probably not in the vat-dyeing of piece goods. In applying the vat dyes to piece goods particularly, difficulty is often experienced due to the formation of a froth or lather on the surface of the liquor. This lather is usually full of the oxidized vat dyestuff, often called "flowers," and where these particles become attached to the goods they sometimes cause unevenness, etc. A peculiar thing in connection with Nekal BX is that on adding about 1 gram per liter to the dye bath the froth becomes white instead of deeply colored by the "flowers." This difficulty is more prevalent with some dyestuffs than others, particularly Indanthrene Blue RS, with which the above was demonstrated. While the above is undoubtedly no cure-all for vat-dyeing troubles, it may be of some assistance.

There are several kinds of Nekal, and the AEM brand is used as an emulsifier instead of a wetting-out agent. This renders it of interest in connection with the scrooping of cotton or rayon. Instead of saturating the goods with a soap solution and then precipitating the fatty acid in the goods by immersion in an organic acid bath, the material may be treated in an aqueous emulsion prepared with Nekal AEM and containing about 5 c.c. of oleic acid per liter. Leonil LE

is another emulsifying agent particularly recommended for use in the preparations of spinning emulsions.

Ramasit WD Conc. and Ramasit I are concentrated emulsions of paraffin, probably prepared with Nekal AEM. Ramasit WD Conc. is used along with aluminum salts for waterproofing wool, cotton, rayon, silk or unions. The I brand is recommended for use where it is desired to add paraffin in an emulsified form to sizing or finishing mixtures. It is also used in the scrooping of cotton and rayon.

Another wetting-out agent for the degreasing or cleansing of textile materials is Laventin BL. This liquid probably consists, at least largely, of a mixture of solvents, and is used with soap in the scouring of wool and other materials.

In closing, I wish to acknowledge my great indebtedness to Col. Herman A. Metz, president of the General Dyestuffs Corporation, for the letters and introductions to these plants which made my visits possible.

Artificial Silks and the Dyestuffs Industry

The Importance of an Effective Alliance

Dyestuff Manufacturer's Opportunity—Marketing New Products—Need for Large Units—Public Judgment—Fastness

By "TEXTRION"

TO anyone familiar with dyeing and kindred problems before 1914, it is interesting and even amazing to realize the advances that have been made in development of artificial silks, at any rate in Great Britain, especially during the last decade. Artificial silk, circa 1913, was just appearing in the dyestuff manufacturers' handbooks. Information in comparison with nowadays was decidedly scanty, and, as may be imagined, several ideas which gained early vogue have now gone "by the board," and, in many senses, a clean sweep has been made and a new technology has been created. This is not to say that dyeing now takes place in a vacuum, and that water as a dyeing medium has been superseded, but simply that the whole matter is viewed on its own particular merits, free from certain prejudices and traditions attached to prior dyeing eras. Artificial silks have been variously hailed as mere innovations, as future possibilities, or as an immediate panacea in relief of distress —according to the incidence of introduction.

One might have imagined after seventy years of synthetic dyestuffs that the same spirit of intensive inquiry which animated dyestuffs manufacture would have largely exhausted basic researches into the chemistry, etc., of those fibrous materials for which synthetic dyestuffs were primarily developed.

But perhaps, in some measure, the alchemy of the natural dyestuffs was less revolutionized by the coming of the first synthetics than history would have the moderns believe.

Or perhaps the complication of modern life having infected textiles also, has in analogous manner introduced a new textile pathology which calls for its own modern treatment. It may be incorrect to allege that natural fiber research did not keep apace with the chemistry of coal-tar products, because, after all, it was the investigation of cotton that gave inception to the modified celluloses of present synthetic fibers. And, conversely, it is possible that so long as the sheep grows wool, just for that length of time will fresh information be forthcoming regarding that natural product. But whatever gaps remain to be bridged in the intellectual grasp of the metabolism of sheep or silkworm, there can be little doubt that the coming of synthetic textile fibers was at least as revolutionary as the advent of artificial dyestuffs.

Without attempting to speculate on the probable course of events had England retained the most intimate touch with dyestuffs evolution from the earliest days of synthetic production, it is not hazarding an opinion to state that the present possession of a well-established dye manufacture by this commonwealth is not merely fortunate but, probably, in a considerable degree vital to the interests of the home artificial silk industry.

Dyestuff Makers' Opportunity

That, on the other hand, the rise of the new fiber has provided the British manufacturer of dyestuffs with an unique chance to lay his youthful enterprise alongside a novel series of fibers and thus to commence on equal terms with his long-established foreign competitors has already been pointed out.

One has only to review the present position to realize that the domestic maker has not betrayed this charge. It is probably correct to state that the extension and growing influence of synthetic fibers has stimulated and enlarged the scope of investigation among the natural fibers. Further, it would seem that the new fibers, so far from simplifying dyeing theories, have even added a degree of complication to some aspects of this study.

From all points of view, therefore, it is obvious that the new fibers act as a spur to present ingenuity and to work demanding a high degree of vision and confidence in the future. It is almost impossible, even now, to read again, without a thrill, the romance of the synthesis of Indigo—the triumph of intensive research over the seeming impasse, the modeling and remodeling of processes, the faith, at times apparently entirely speculative, which maintained huge financial outlay. But the possible prize was enormous, and success brought about the gradual suppression of natural Indigo cultivation. One lesson may here be learned in passing. In spite of the huge expenditure of time and money, not a pound of synthetic Indigo tin was put on the market until its promotors were satisfied with their product almost up to the last conceivable detail.

Marketing New Products

Even in these progressive days salesmen are continually "up against" conservatism, and it is more important than ever that premature marketing of new products should be avoided. The maker should study the "con" as well as the "pro" side of his product. It is still possible to be "damned with faint praise."

In the case of synthetic Indigo there was the certainty of huge output awaiting the correct product, and the sheer merit of the innovation overcame prejudice much more quickly than a less perfected initial product would have done. But imagine, on the other hand, researches for special dyestuffs to color some new ester-cellulose and the position thus arising.

It is probable that the new fiber has its own peculiar dyeing qualities, its future is speculative, suitable dyestuffs may not be applicable to any other forms of dyeing.

On the face of it any research would appear to be more for its own sake than for any chance, even of out-of-pocket expenses within a reasonable period. Still, such researches have been and are, at present, being conducted in a spirit of commercial adventure—as well as vital necessities of progress, although possible rewards might appear decidedly circumscribed at present.

The cost of speculative research, however well directed, in individual cases can be considerably swollen by what may be practically simultaneous duplication of various lines of inquiry in different hands. In addition, it is evident that immediate rewards are by no means certain, even in the event of technical fruition, and there must always be a certain proportion of non-materialized effort to be paid for.

Need for Large Units

So that it is evident that economical progress in investigation as in manufacture demands big units of productive scope and financial resource. The machinery, mechanical, technical and commercial of modern dyestuffs manufacture is vast, and it is only possible under unified control of resources of materials, plant and personnel of what were formerly separate businesses to insure stability in activities which call for big outlay of capital and for investment of capital to finance future possibilities that have no immediate revenue.

The peculiar intimacy between the artificial silk industry and dyestuffs manufacture may be illustrated in another interesting way. Imagine the complete cutting off of all synthetic dyestuff supplies in the present year of grace!

The natural fibers even in union fabrics could revert fairly well to the old natural colors—animal, vegetable, and mineral. At any rate, dyeing could "carry on," but one is afraid that artificial silk activities would be more significantly curtailed or in some cases annulled.

Artificial silks, therefore, may be said to be the children of the age—and whether modern culture has rendered their adoption possible or whether their appearance has developed modern culture is debatable—the reason probably being intermediate—but consumers' demand usually depends on a measure of reliability, and not merely ephemeral beauty, and it is here that the necessity for close alliance between dyestuffs and fabric production becomes apparent. In a sense, fibers are primaries, colors are secondaries, but no such raw classification finds lodgment in the modern appreciation of fabric and color. When one refers to a "revival of color" one thinks instinctively both of brightness of hue and luster of fabric.

It is familiar that there have been times in history, cults among peoples, etc., when Puritan or Cavalier fashion held temporary sway. One does not buy garment or fabric on a chemical analysis. Fashion, style, usage, written or implied guarantee, etc., play their part in selection. The most satisfactory way to test "handle" is still by the hand.

Similarly there is no artificial mechanism capable of judging beauty in shade.

Public Judgment

Public judgment then becomes the supreme partner in a triumvirate, including fabric producer and color maker. The peculiar needs of the artificial silks appear to dictate to the dye maker in a more significant manner than did the older fibers at any stage of the synthetic era.

Of course, dyestuff development has always influenced fabric evolution, in fact, in many cases it may be said to have preceded it, especially in the development of union fabrics, but nowadays it seems as if the position were almost entirely reversed in the artificial silk world—as if fiber evolution has preceded special dyestuff production.

Take, for instance, the discovery of the sulphur dyestuffs enabling a wide range of cross-dye cotton-warp lusters, etc., either in solid shades or two-color effects, or the hydrosulphite vat colors which extended the scope of color-stripe piece-bleached fabrics. In each of these cases color came first, and suggested textile outlet. The mod-

ern instance of the "Icyl" dyestuffs (B.D.C.) reveals the opposite action in play.

Fiber production (viscose) showed too often widely varying fiber qualities as regards dyeing uniformity, and subsequent researches resulted in a new series of colors —which are specially designed to overcome these fiber inequalities—being inaugurated on a commercial scale. On the question of artificial silks participating in the trend towards the use of more permanent colors the old argument is again raised as to the relationship between color durability and fabric permanence. It was, perhaps, never possible to draw more than an approximate ratio. One expected an army uniform to occupy a different position to a colored cheap ribbon.

Some years ago it had become usual to regard the artificial silks more as "decoratives" than as "utilities." Artificial silks suffered initially in this respect just as the first synthetic dyes did. In fact, when the early novelty had worn off, the inceptive failings of both created a false prejudice.

Fastness to Various Conditions

With the marked advances in controlled preparation, throwing and thread production, the initial prejudice has been largely overcome, and with improved textile qualities the artificial silks enter more into utility fabrics which meet the modern demand for beauty and usefulness.

Celanese by virtue of its apartness in the dyeing sense has developed its own special dyestuffs, both in colors of moderate fastness and advanced permanence. Viscose and similar dyeing types are gradually tending toward the faster colors of the cotton types.

Thus there are being produced to-day, in addition to ordinary shades of no particular resistance, colors fast to washing and laundering, fast to light for tapestries, fast to cross-dyeing for worsteds and hosieries, fast to bleaching for piece goods, hosieries, laces, etc., fast to rubbing and perspiration for linings, and so forth.

The above list plainly shows that artificial silks are already well represented among utility fabrics which by their nature require a considerable degree of permanence both in domestic use and in resistance to factory and finishing processes necessary to fabric production.

Artificial silks figure increasingly in export cloths, and returns of dyestuff consumption show considerable advances in sales of those dyes of more difficult application which cover in many instances the category of the more permanent colors.

Position of Chemical Industry

If this trend of fast dyeing of artificial silks is to be expandingly persistent and the future of British textile trade is to move more and more towards the higher qualities in many fabrics, the advantage of possessing a first-class, comprehensive British color industry is emphasized. The importance of the fine organic chemical industry to any manufacturing country can scarcely be exaggerated, and both dyes, fibers and other modern necessities are thereunder economically linked.

It has been stated fairly recently that dyestuffs were taking a secondary position in comparison with other organic chemical activities.

Whatever be the case, their necessity is undoubted, and with the possible evolution of synthetic fibers a sound domestic dyestuffs industry is no mean contribution to success. Extravagant claim has been made as to the virtues and possibilities of artificial silks, and errors of premature advertisement have been committed. But with the gradual co-ordination of the factors of production, with the pooling of research information, with the assurance that fabric requirements will be met by British dyestuff advances, with the consolidation of the new technology, the artificial silks may be relied upon to find a place in textile economy based on intrinsic merit in contradistinction to fleeting appeal and passing fancy.—Textile Argus.

SOME CAUSES OF SOAP SPECKS

SOAP specks usually put in their appearance in hot suds or hot rinses. The use of a soap of low titer at a relatively high temperature in the suds will cause a precipitation of the soap and will decompose soap.

Continual pounding, such as is produced in an unusually long-timed period for a suds operation, will promote the breaking down of soap to form soap specks. There is a serious need in every modern washroom to have all washing machines equipped with timers.

Soap specks are very easily formed in the first hot rinse where the soap emulsion is diluted by the addition of fresh water. The weak soap solution then breaks down at a high temperature, precipitating fatty acid, etc., in the goods.

The use of hard water under conditions which permit the lodging of lime soap in the goods will produce another form of soap specks.

Hard bleach has the same effect.

The use of sour before all of the soap has been removed by rinsing will result in a separation of the fatty acid part of the soap and it is deposited in the goods as soap specks.

Soap specks lead to poor color in the work and a general offensive odor caused by the soap fatty acids.—Cowles Comments.

President Theodore Boettger, of the United Piece Dye Works, has announced plans for a co-operative insurance, whereby insurance covering disability and death benefits may be had by all employees at a low premium. The United Piece Dye Works employs approximately 3,500 people, while a similar number is engaged in the Hawthorne and Weidman divisions in Paterson and at the Allentown plant, making a total of about 7,000.

Simplification Applied to Color Fashions

Color Rotation Applied to Industry—Scientific Color Selection

By Waldon Fawcett

APPEAL has been made to the U. S. Department of Commerce by firms in the fields of housefurnishings and kindred specialties for application of the principles of industrial simplification to the use of decorative colors. This call for relief from the latest overindulgence in diversification is the sequel to the craze for color in the home which has swept over the country during the last few years, extending in expression to the most commonplace utilities of everyday life.

In the earlier stages of this color era, manufacturers, enthusiastic over the new-found possibilities of styling goods by means of color, thought only of utmost indulgence of the public taste. In certain lines of household equipment, latter-day competition has been measured almost wholly in terms of color novelty. With color persuading consumers to replace standard articles, not demanded by exhaustion, producers were, at first, loath to ask any questions of this new stimulant to sales. Gradually, however, as color rivalry has progressed, manufacturers have sensed an economic loss and waste to industry in promiscuous and too frequent changes of color in ornamentation. This sentiment prompted request for intervention by the branch of the Commerce Department, which is the official promoter of commercial standards.

To the Federal organization, the proposal for the simplification or stabilization of color in industrial "dress" came as a responsibility distinctly new. What might be termed the regular, or habitual function of this branch of the Government has been that of a service agency devoted to the negotiation of agreements in the several lines of industry for reduction of unnecessary sizes, elimination of odd numbers, superfluous models, and slow-moving varieties. Up to this time the simplification specialists on the Commerce staff have studiously kept hands off all issues that have extended from the simplification of weights, measures, and dimensions to regulation or repression of the features that give to goods distinctive individuality in appearance.

It was in deference to this tradition that the Commerce Department has been loath, in all its simplification programs, to attempt any project in varietal reduction that might involve the so-called gift and display packages, employed in various industries, or the distinctive containers which the originators aspire to have the purchasing public recognize as trade-marks. Simplification of color in commodity adornment is not precisely an invasion of this sacred field of allowable originality in goods get-up, but it approaches closely to it. Therefore, the counselors at Washington have proceeded slowly in their latest task. Finally, however, there has been worked out a tentative plan which, upon approval by at least 80 per cent of the producers in color-using industries, may be tried out in lines such as kitchenwares, including dusters, mops and other dyed products.

Color Rotation in Industry

Color rotation, or color rationing, is the designation which has been applied to this new device for conservation of inventories and sustainment of public interest. Substantially, it represents concert of action within an industry, or a branch of an industry, to the end that colors will "take turns" in their presentation to the public. The working arrangement, as sketched, calls for the adoption by a producing group, at the beginning of each year, or each production season, of a color card which shall cover the range of tints available during the ensuing period. At the option of the co-operators and according to the conditions in the particular industry, the color restriction might be absolute or the approved colors may be listed as standard with the proviso that unlisted colors would be treated as special orders involving payment by the purchaser of the extra costs entailed by production outside of routine.

The sponsors of color rotation concede that its success in any quarter will be dependent upon the ability of the commercial strategists to make up each year a color chart compact enough to bring economies in production and distribution, yet sufficiently diverse to allow ample latitude in selection by consumers. There remains to be worked out the plan to be followed in clearing shelves of goods in a passing color range when a new color dynasty is about to succeed to the throne. Presumably, however, this would be no more difficult than the equivalent problem which has been solved by rug makers and other manufacturers who regularly, once or twice each year, sanction concessions in retail prices in order to move the remaining stock of patterns which are about to be supplanted by new designs or new combinations of color.

Color rotation, as contemplated, would be sufficiently elastic to allow the prompt translation into self-rationed industry of any new shade that might at any time be developed. Likewise to permit the capitalization of any hue that might suddenly attain vogue through an exceptional circumstance such as association with a fresh fad or a personality conspicuously in the public eye. It is acknowledged that the logical result of color rotation will be to create "fashions" in color-using industries, whose prosaic products were formerly undated, save by radical changes in models. With marketers in lines such as kitchen and bathroom equipment, this injection of the fashion element, via color, is welcome rather than otherwise. They foresee a compulsion for more frequent refitting or refurnishing by hotels, apartment houses, and all manner of institutions whose appeal to the public is dependent in some degree upon the note of modernity and proclaimed up-to-dateness in their settings.

Scientific Color Selection

One argument that is presented in behalf of orderly revolution of color in merchandise is that color rotation will "organize" the serial use of colors that have proven their adaptability to the industries in which they are employed. In the stampede to color, in which almost all industries have engaged this past year or two, it has come about that some industries, suddenly made color-conscious, have invoked colors that experience has shown to be ill-suited, for physical reasons, to the commodities to which these have been applied. Color rotation would embody scientific color selection calculated to hold a given industry to the colors suitable, artistically and technically, to the medium of expression. Finally, it is urged that color rotation, worked out, seasonally, well in advance of opening dates, would prove a boon to the industries whose production plans must, in some measure, be keyed to the policies of other more or less closely related industries. An illustrative case in point is the interdependability of the producers of upholstery fabrics and the manufacturers of furniture. Color restriction of known scope in a basic industry would automatically lead to color harmony in the subsidiary and supply trades.

Practical Hints on the Production of Bright Colors on Textile Fabrics

Part XXXVIII

(*Continued from page 486*)

Improper Filling—A Heavy Sizing Plant—Its Advantages—An Inexpensive Sizing Machine—Construction and Special Features

By RAFFAELE SANSONE

BY changing the nature of the filling bath used with the plant described in the previous instalment, a less regular effect was obtained. This, as shown in Fig. 7, has more sizing material over some portions of its surface than in others, giving the material a more or less irregular appearance, which was more easily visible when the colors were dark. No amount of calendering could correct the defect, which rendered the fabric less valuable, especially as the coloring was also slightly darker in some portions than in others. With certain articles a strong size was applied, which did not hide, as shown in Fig. 8, the structure of the textile. In this instance the filling was distinctly visible to the naked eye, even with the lightest colors, and the material assumed a somewhat rough appearance and handle, which made many class it as a common article. By varying the contents of the sizing paste but little improvement was possible.

The writer had the opportunity recently of seeing dirty, cheap, cotton goods produced from very loosely woven fabrics that had been so literally covered with filling inside and out that all the texture had disappeared completely. In this instance, the work of the finisher was complicated, as he had to give the material a slight shine, without pressing it too much, or giving a papery "feel." The dyeing did not improve matters much, and the article could only be placed on the market among the commonest classes of goods. In its construction low-grade cottons could also only be employed, and the sizing had to serve, not only for increasing the thickness of the fabric, but also for rendering it stronger, covering also many of the weaving defects.

When it is necessary to produce very heavily sized goods, the ordinary padding machine can be employed for the purpose with conveniently chosen color pastes. In this instance the material is treated several times and dried between each treatment, and two, three or more layers of the colored pastes are deposited one above the other, transforming the thinnest material into a fairly thick fabric with much more than its weight of dyestuff and filling. The employment of time, labor and sizing

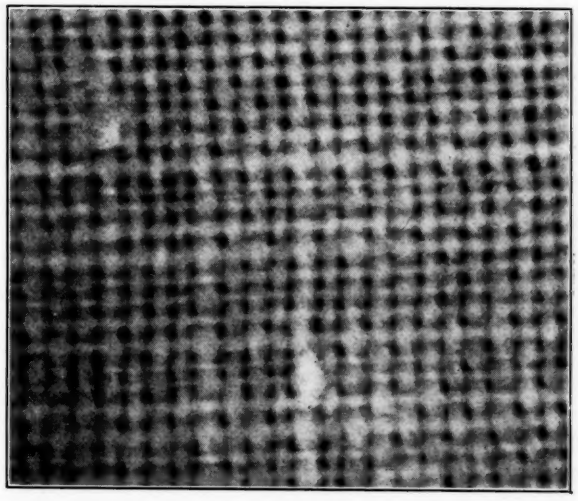

FIG. 7

paste is, however, great, while the effect obtained often lacks some of the qualities required by the market, especially if it is intended to push a lower article for one with more cotton.

Better results are possible by using continuous machines constructed on the principle indicated in Fig. 9,

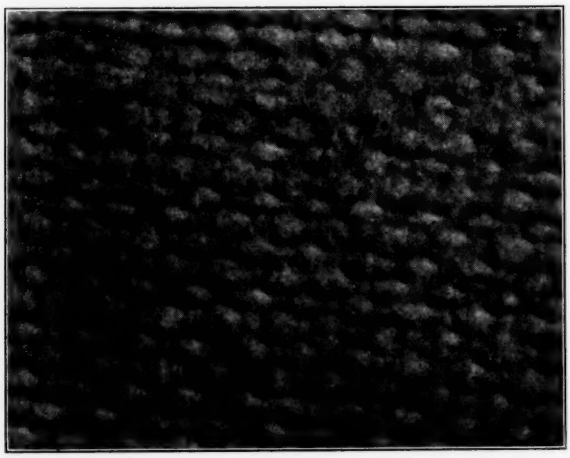

FIG. 8

where the cloth is treated in eleven compartments one after the other with weak sizing and coloring baths made up in the most convenient manner. After each impregnation and passage through the respective pair of squeeze cylinders, it mounts into an upper chamber, where hot air subjects it to drying, most of the water evaporating off rapidly so that by the time it returns to a further compartment it is in a state of absorbing more size, without losing the greater portion of that already contained.

When, however, it makes its way out from the last nip, it passes for another time in the upper drying chamber, and is transformed there into pieces, or rolled onto wooden beams ready for the final finishing operations. Through the arrangement, a gradual filling with a very high content of size is secured, which at first enters in the innermost cells of the fibers, and then covers the outer surface of the fabric, eliminating all holes or interstices, in such a manner as to hide all texture, taking away most of the fibrous appearance.

ADVANTAGES OF THE PLANT

The above plant would offer the following advantages:

1. The cloth is treated with dilute baths of the filling agents, with baths the strength of which is increased by degrees, with baths the strength of which is reduced, or with baths that simply contain at the beginning starch and later mineral filling agents.

2. The dyeing operations can be conducted in the last four, three or two compartments, before these, or in all compartments at the same time, as may be preferred.

3. Each compartment can be employed for applying a different dyestuff, forming in this way the required shade through superposed layers of different colors.

4. The same machine can be employed for treating only one lot of cloth continuously, or two or more lots, with very little change in the disposition of the upper hot air drying chamber.

5. If the hot air drying chamber is lofty and takes a large floorspace on the upper floor, the speed of the treatment and the consequent production is very great.

6. The sizing operations can be often conducted in the cold, avoiding the use of steam, which would only be used for preparing the sizing baths and drying the goods.

7. If required, a portion of the sizing baths can be used cold, and the rest warm, as during the drying the treating liquids have sufficient opportunity to penetrate into the innermost cells of the cloth.

8. Through the numerous squeeze rollers at disposal, the cloth leaves each treating compartment with a regulated quantity of the sizing and coloring fluid, so that the drying takes place much more rapidly than if the material mounted without an intermediate pressing.

9. If a small quantity of dyestuff is introduced in each compartment of the machine, by being dried eleven times on the cotton cloth, this remains after the final drying with a shade of a certain intensity.

AN INEXPENSIVE SIZING PLANT

With the present methods of filling cotton fabrics, where it is the custom to cover rapidly with the complete charge, the use of large quantities of adhesives, such as starch, gum, dextrin, island moss, lichen, glue, etc., is necessary for retaining at once the largest quantity of filling material. In the future, because of the increasing costs of the same, endeavors will be made to reduce the use of these materials through the use of special means as yet unknown. One means of reaching this objective will be through applying the filling and dyestuffs from

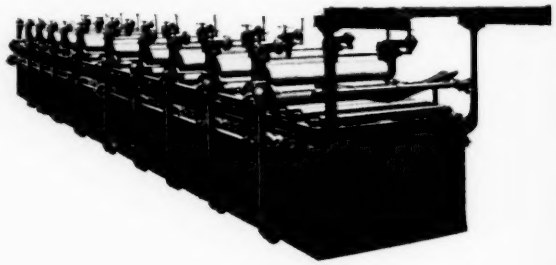

FIG. 9

several baths one after the other, and during many intermediate drying operations, conducted under conditions that will keep down the cost of steam or hot air. A plant in which this principle can be developed to full advantage is constructed as shown in Fig. 10.

Here is to be seen a series of ten fillings and dyeing

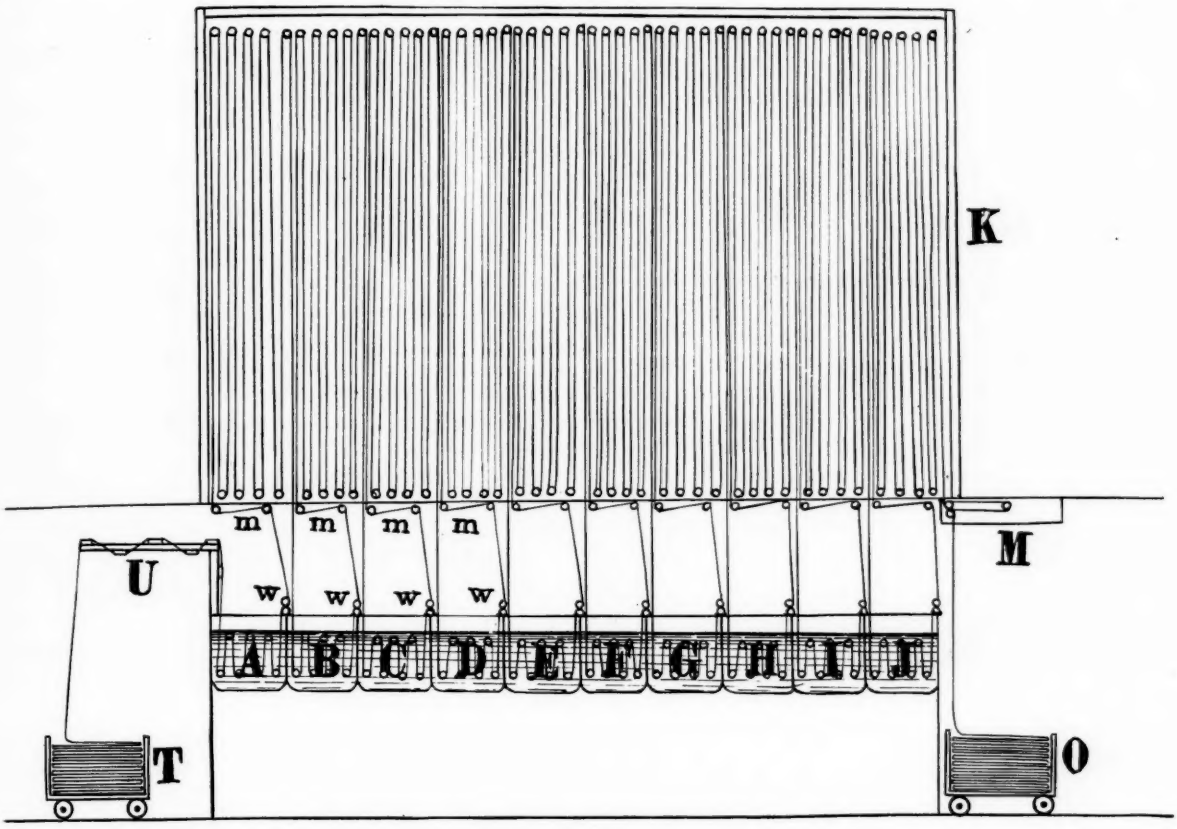

FIG. 10

vats A, B, C, D, E, F, G, H, I, J, placed close together, so as to form a long straight line. Such vats are arranged at a short distance from the floor of the works on two light side frames, and contain a long series of lower and upper impregnation rollers. At the end of each treating trough is a light pair of squeezing rollers w, w, w. w, w, w...., furnished with elastic pressure, while at some height above are the series of rollers m, m, m, m, m, m, m...., that lead the material upwards into a large drying room K, where it forms a long series of parallel plates while passing a good part of the time continuously up and down in the oven itself, and a shorter time down from the oven into the impregnation vats. By this arrangement, after the first impregnation, the material is dried and passed into vat B, and into succeeding vats, with a drying after each immersion until reaching vat J, after which it is dried for the last time in the oven, and passes out from this through the folding arrangement M, to fall in piece form in a small copper-plated iron wagon O, where it is led to the calender for the finishing operations.

The material enters the plant in this case from the small truck T, mounting from here to the pair of arms U, where several lined copper bars remove all folds, and deliver it in fully spread condition into the first bath of treatment in vat A. Drying room K is double walled, and in this instance hot air, prepared in a separate electrically heated apparatus is made to circulate through channels arranged between such walls, so that it enters at the bottom on the right, gradually mounts upwards, passes across the top, and descends on the left, to making its way through a tube and be distributed in the interior of chamber K through a copper-plated iron tube or Monel metal tube containing many perforations. At the upper portion of chamber K a ventilator pumps the hot air upwards in several portions at the same time, bringing it back to the electric heater, which reheats it for further use.

ADVANTAGES OF THE PLANT

The above plant possesses several important advantages, some of which can be indicated as follows:

1. By employing weak baths of any vegetable matter with slight adhesive properties, and a convenient mineral soluble salt, the two come to be fixed in considerable quantity by the time the cotton fabric reaches the end of chamber K, taking up a sufficiently filled appearance to satisfy many requirements.

2. With many articles the use of starch, dextrin, glue or the mosses, can be avoided altogether, greatly reducing the cost of the production, while producing articles which often have new features and attract buyers through this reason.

3. The ten impregnation troughs can contain the same dyeing and filling bath, or can contain two, three or more baths, in accordance with the class of goods to be produced.

4. The dyeing operations can be performed in one or more of the vats at once.

5. The first five vats can be used for distributing the weak solution of an adhesive product, and the second five for introducing mineral salts, with or without talc.

6. If necessary, the filling and dyeing operations can be combined with special processes, through which the cloth is first bleached to a white and then colored, first cleaned through a soaping and then dyed, first oiled and then dyed.

7. If necessary, the material can be rendered incombustible by regulating the baths present in the ten vats.

(To be continued)

ITALY'S DYE AND CHEMICAL INDUSTRY

The Important Manufacturers—Range of Dyes and Production of Other Chemicals

By Assistant Trade Commissioner E. Humes, Rome

(From Chemical Division, Department of Commerce)

THE Italian dyestuffs industry has made great forward strides since 1914, and is now able not only to supply domestic needs of the more common dyes, but to provide a considerable surplus for export. There are a number of factories making their own intermediates. Among the more important manufacturers are A. E. Bianchi & Co., with a daily output of about 5 metric tons of dyestuffs; the Italica, which manufactures excellent chrome and acid dyes, direct cotton dyes, basic dyes and a complete line of sulphur dyes. This company now employs twenty-eight chemists, as compared to four in 1914.

Another important manufacturer is the Materie Coloranti Bonelli of Cesano Maderno, which not only manufactures dyestuffs and intermediates, but also operates an electrolysis plant for the production of electrolytic caustic soda from which 3,000 cubic meters of hydrogen are obtained as a by-product in twenty-four hours. The electrolytic hydrogen is used on recently developed important manufacturing processes in connection with the preparation of benzidine, para-aminophenol, alpha-naphthylamine, para- and meta-phenylene and toluylenediamine, H acid, French, Cleve and Laurent acids and peri- and amino-salicylic acid. Likewise the problem of the transformation of nitrobenzene into hydro-azobenzene, without the aid of zinc or iron powder, has been solved by the use of the sodium amalgam prepared directly from the electrolysis of sodium chloride. In June, 1923, the Cesano Maderno plant alone was turning out about one ton of benzidine a day. At that time, however, the synthetic indigo and the anthraquinone dyes were not being made. The Cesano Maderno plants of the Nobelli now have an annual capacity of over 1,500,000 tons of synthetic indigo. Other vat dyes are also being manufactured, such as the yellow vat dye of the Industria Chemica of Melegnano and the black, blue and blue-black Indanthrene which Belloni e Colli has recently put on the market, and in the preparation of which this company plans to specialize.

The Industria Chimica at Melegnano is a comparatively new concern which has attracted attention both at home and abroad for its excellent chrome dyes. Italian dye manufacturers are manufacturing not only sulphur dyes but have been successful with a number of acid dyes among which may be mentioned the Light Yellow, Acid Red and Black, and Tartrazine. Excellent basic and direct dyes are also made, and most important of all is the progress made in the preparation of yellow, brown and black chrome dyes. An outstanding example of the direct dyes is the Diamond Black P. V. of the Industria Chimica. When this domestic dye was put on the market for the first time, the price fell from 40 lire to 20 lire a kilo.

The Fabbrica Lombarda A. E. Bianchi, the Inca, and the Ledoga have also given special attention to the manufacture of chrome, aniline and sulphur dyes. In Piedmont the Fabbrica Boletti & Co. was one of the first to produce sulphur dyes and lakes during the war. In 1919 this company combined with the Swiss Rohner. In this same district the Schiapparelli is producing aniline oil and sulphur dyes and the Industria Piemontese aniline dyes.

Special mention must be made of the S. I. P. E. Cengio in Liguria. This concern, which also controls a large number of gas plants distilling about 600,000 tons of coal annually, produces in the twenty-four hours 8,000 kilos of aniline oil, 2,000 kilos of H and beta-naphthol acid, 800 kilos of para-nitroaniline, alpha-naphthylamine, etc. They also manufacture numerous nitro and chloro derivatives of benzene, toluene, naphthalene, phenol and aniline, and other important products used in the preparation of synthetic dyes, medicines and explosives. The company also has a plant for the production of several tons of oleum daily. It also produces daily 2,000 kilos of 85 to 90% formic acid, 4,000 kilos of caustic soda, 3,500 kilos of chlorine, and 4,000 kilos of 100% sodium sulphide. The S. I. P. E. Cengio, the Bonelli, the Italica, and the Schiapparelli merged last year. The total output of synthetic dyes manufactured by the group is estimated at over 3,600,000 kilos annually, inclusive of Sulphur Black, but excluding Indigo.

Synthetic Indigo is produced in Italy by one company only, the Fabbriche Italiane per Materie Coloranti Bonelli, a member of the group which includes the S. I. P. E. Cengio, the Italica, and the Schiapparelli, all of which are more or less controlled by the Societa Italiana del Gas di Torino. The Italian plant is located at Cesano Maderno and has a yearly capacity of 1,500,000 kilos of Indigo in paste at 20%. This production capacity is more than sufficient to cover present Italian consumptive needs, which are reckoned at approximately 600,000 kilos per year.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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ARE TEXTILES SO DIFFERENT?

INSPIRED by the recent news that the Eastman Kodak Company had perfected a means of taking colored motion pictures with home "movie" cameras, M. D. C. Crawford, of the Daily News Record, preaches one of his characteristic sermons on research to the textile industry. The vigorous, straightforward style in which he expresses some of his conclusions prompts us to reprint a few paragraphs. As a consistent advocate of technical research for the textile industry the REPORTER is naturally in general agreement with what Mr. Crawford says.

"If you want to get the public dollar," he declares, "research is about the most profitable investment you can make. In this deduction the textile industry does not agree. It looks for salvation in institutions to tell them how many looms are not making money; or to add half an inch to the Chinaman's shirt; or to urge folks to wear this fiber or that fiber for patriotic, hygienic and charitable reasons.

"Perhaps the textile industry does not need research. At least, I am told they do not by textile men often enough; but if they do not need scientific research of the highest quality, then they are different from any other of our great and financially successful industries. And they certainly are different!

"Any industry satisfied with existing technology, markets, methods, etc., is in a fair way to become an interesting study for the economists with a taste for archeology. People spend their income to satisfy their wants and whims.

"A few years ago women wore almost three times the yardage and materials they wear to-day. Our grandmothers would have prophesied pneumonia, if they had survived the moral shock of the ordinary apparel of the women of to-day. Suppose men get the idea that they, too, have too many clothes on, and begin to discard vests, neckties, hats, trousers below the knees—and then invest the surplus income in some of George Eastman's latest novelties, or buy an air flivver from Henry Ford?

"It is a very risky business in this day and generation to attempt to build a business on necessity; and if our innumerable and increasing number of textile institutions of different kinds and grades would devote their attention to getting a few men and women, scientifically trained and adequately paid, herded away in a place called a laboratory, we might find out as much about the textile industry as George Eastman has found out about the photographic industry."

A MIDSUMMER DAY'S DREAM

A Fable for Dyers

ONCE upon a time there lived a poor dyer named Ben Zol. He was the most dissatisfied of mortals, forever bemoaning his lot. He looked upon the world as cold and unkind, and upon his profession as one crying out for vast reforms. For Ben was a dreamer, an idealist, and he dreamed of a world where dyehouses were built like motion picture palaces, managed by human beings and untroubled by mishap or problem. But because he dreamed at his work, one unlucky day found him without a job. He balanced his bankbook, discovered that he had two hundred dollars laid away, and decided forthwith to take the wife on a holiday.

One month later we find Ben home again, scanning the help-wanted columns in the Sunday paper and in the AMERICAN DYESTUFF REPORTER.* That night he resolved to cheer up, forget his dreams and buckle down to a real career; that is, presuming he found employment soon. He decided that if the world did not change to suit his ideals, he himself would bring about a few changes. So, meditating, he dozed off.

Next morning, when the alarm called him back to consciousness, he cast a pillow at the clock, rolled over with a grunt and was about to resume his slumber, when suddenly he bethought himself of his resolution. He arose, donned his best suit and set forth to seek work.

As he turned the corner of his street he clicked his heels in a sudden stop, his mouth agape, and stared across the road at a low white stone building with many large windows. He had never seen the structure before, and his amazement increased when he saw over the doorway a large sign reading, "Modern Dye Works, Inc." He crossed the street and opened the door; a sociable old fellow in the office greeted him courteously, as though he expected Ben, and introduced himself as the proprietor. He showed Ben through the plant, where dyers were standing by their machines like soldiers at attention, assistants behind

*He should have used a "classified" in the A. D. R.—Rate 2 cents per word.—Editor.

them straight as sticks. The place was spotless; walls and ceiling painted a fresh, milky white; the stone floor dry and swept to a polish; there was ample space among the forty or fifty machines lined up along the wall, with a wide aisle down the center. Ben noted how pure and cool the air felt, with not a wisp of fog anywhere. The morning sun, shining in through the windows, glistened on the polished nickel parts of the machinery. But not a wheel moved.

"Why the idleness?" Ben inquired, waving his hand.

"They have been waiting for you," the proprietor said; "they start only on a signal from the foreman."

Ben arched his eyebrows and was about to ask when his new title had been conferred, when the old fellow showed him a desk in the corner, on one side of which dyed skeins were neatly stacked in several piles. This, he was told, would be his headquarters.

At a word from the man Ben pressed a button on the desk and a gong clanged through the silence. As the echo died away he turned and beheld the machinery whirring merrily from one end of the long room to the other and each dyer stepping about briskly, adjusting a knob or a dial, consulting a meter or scanning the goods as they passed through the vat. To say he was astounded to find such a perfectly operated plant is to put it mildly. He felt sure that some mistake had been made, of course, and that the real new foreman would presently appear to divest him of his title. But this thought did not keep him from marveling at the incredible orderliness of the place, its superb equipment so efficiently laid out; at the ideal working conditions, the skilled workmen and the general air of controlled, clockwork perfection that pervaded the entire plant. It thrilled him to stand in such a place; he had dreamed of a dyehouse like this, but never had he hoped to find in this day and age anything so nearly like his vision.

As all was apparently running smoothly, Ben wandered about curiously, entered a door in the wall at his left and found himself before a table on which stood row upon row of chemical glassware and various testing instruments the like of which he had never seen. Shelves on the wall held countless bottles and jars of colored solution, all neatly labeled. A series of charts and graphs and numerous tables hung in frames on the opposite wall. These appeared to be records of pH tests and fastness standards, tabulations of temperatures and weights, and comparative shade formulas methodically charted with relation to fastness.

Turning at a sound, Ben saw at the end of the laboratory a man bent over one of the testing instruments. Ben approached him, introduced himself as the new foreman and politely inquired on what test the chemist was then engaged.

"Checking for fastness a new Direct Blue we may buy, sir," the man answered alertly. "Class 1-A; so O. K."

He looked surprised when Ben confessed ignorance of the meaning of the class number. "Highest standard," he replied. "All dyes made now classified; definite degrees of fastness for every color-destroying agent on all fibres, in combinations of colors as well as self-shades. With this table and three instruments can find in fourteen minutes the class of any dye sample submitted."

"What do you test besides dyes?" Ben asked meekly, trying to conceal his amazement at this fellow's erudition.

"Rayon; must, so many brands, kinds, grades of each kind on market; test all samples for dyeing properties before purchasing any new brand. All formulas filed here for each type and numbered; dyer merely told number, knows dyeing method, knows exact result ahead; no guesswork in goods containing rayon."

"Marvelous," Ben gasped. "Don't guess at fastness, nor at kind of rayon," he mused; "I guess nobody in the plant guesses except me." How things had changed in one month! The chemist showed him a bookcase of bound volumes containing thousands of dyed samples and formulas used in matching, and he was told that all shade matching was done on simple color-measuring instruments—"no guesswork: exact measure of each shade recorded for reference later."

Ben returned to his desk in bewilderment. He was mentally uneasy for a reason he could not at first determine. Suddenly he knew: for the first time in his life he was not dreaming at his work; indeed, he had nothing to dream about. His vision of the perfect world was at last realized. But this thought, strangely enough, did not cheer him. He yawned, drummed idly on the desk and stared, his mind roving aimlessly, at the busy dyers moving among their machines; recalled his conversation with the genius in the Lab, and was suddenly aware that he was very bored with the whole business. Nothing to dream about, no problems to perplex him, no work to do beyond pressing a button —how dull the world had become in a month!

He felt a tap on his shoulder, and as he turned around the long room of whirring machinery, the busy men and the white wall with its windows became blurred as though seen through water, and he found himself staring up into two faces; one was that of his wife and the other was of the alarm clock in her hand. It was noon and the sun was beating down upon his pillow.

C. H.

German necktie manufacturers have combined for protection and presumably for greater strength in export markets. Was it not Germany that had the world "tied by the neck" not so many years ago with its dyestuff combine? But now, according to a dispatch from the Department of Commerce, a German importing firm in Hamburg desires business relations with *American* firms exporting coal-tar intermediates. What a world of difference a few years have made—a few years and an intelligent tariff!

A PATRON OF HIGHER LEARNING

THE high reputation achieved by the United Piece Dye Works has apparently been the bushel under which the light of a personal record made by a director has been hidden. It is not generally known among his many acquaintances in the silk-dyeing trade that Albert Blum, treasurer of the United Piece Dye Works, has been a liberal patron of letters. He was recently appointed chairman of the silk group in the trade groups organized in Greater New York by New York University to assist its Centennial Fund campaign, and in the interesting bulletin issued by the university to announce the progress of its campaign an account is given of Mr. Blum's patronage of higher education.

"His liberal contributions to worthy phases of university work, particularly in France," states the N. Y. U. Bulletin, "has placed his name high as a patron of letters.

"Mr. Blum has made possible at the University of Strassburg six annual awards of $400 each to members of the faculty who have done particularly meritorious work in teaching and scholarship. The aid of one of these awards to a deserving professor, particularly with the favorable rate of exchange, can hardly be overestimated. One is able to publish a long-delayed book. Another has the opportunity to carry on a particular bit of valuable research. Still another may avail himself of much-needed rest and travel.

"So successfully did this plan work at Strassburg that Mr. Blum has now made possible three similar awards at the University of Nancy, a smaller institution. The awards are made by an able board of trustees of the fund. The rector of the University is always a member. Another is Premier Poincare.

"But even with such contributions Mr. Blum could not be content. He has been one of the foremost leaders in raising $400,000 for an American dormitory at the Cite Universitaire, the international student center of the University of Paris. The dormitory will be a literal haven for members of American students who find it advantageous to pursue their studies in Paris, and yet who are without adequate means. Through the stirring efforts of Mr. Blum and his associates the necessary funds for this project have practically been raised."

The degree of fastness to light and laundering now being demanded by the American public is obtainable mainly by the proper selection of dyestuffs. It is with this tenet in mind that the Clemson College Textile School has installed one of the latest types of Fade-Ometers for determining the fastness of colors to light. With this apparatus the students in the Clemson textile course will be able to study the fastness of colors in various materials and to make such tests as their studies may require.

EXTRACTORIALS

We need only to modernize in order to prosper. In most cases colors sell fabrics. Yet they represent only an insignificant part of the production cost. Then why sacrifice the benefits of fine cloth construction, excellent color design and energetic merchandising by the use of inferior dyes?—*Henry F. Herrmann.*

In a manufacturing sense the world is smaller to-day than was a New England village a hundred years ago. Goods that were formerly made alone for each community are now given world-wide distribution. Economic independency is a condition of the past and will prevail in no average community, no country and no large quarter of this earth. Economically the world is now a vastly integrated interdependency.—*Cotton.*

The duty of every mill worker is to demand from their Senators and Congressmen a definite pledge to work and vote for a protective tariff that equalizes wages and assures our present living standard.—*Fiber and Fabric.*

In these days of constant changes, industry is showing its appreciation of the technical man. There has never been more room at the top than now for the man well grounded in the fundamentals of science. Service departments are operated by scientifically trained personnel. Salesmen are similarly trained, and to-day more than ever before the purchasing agent is a fiscal agent placing orders for the material specified by the chemist and the engineer through salesmen who talk the scientific language.—*Industrial and Engineering Chemistry.*

For their own protection dyers and finishers are compelled to qualify on stock and on weave construction, and this knowledge has saved many good men their positions during the past few months, as there has been increasing trouble due to the attempt to make a fabric cheaper by manipulation of wool or cotton and by further juggling on the loom with no word to the goats of what is coming through; but prompt blame is handed out when the effects called for are not secured.—*Fibre and Fabric.*

There is a new competition of wealth and a competition of mergers that is groping its way, not trying to build for itself any powerful and succulent octopus to drain the pocketbooks of the nation, but in order that it may stabilize the manufacture and marketing of the products that it consumes. There will always be on the outside smaller desirable organizations, and less desirable organizations that will not only always compete with

these, but will compete with each other; and inasmuch as they are a molecule in the great industrial body will produce health or disease according to their action.—*W. M. McLaurine, secretary-treasurer of American Cotton Manufacturers' Association.*

The Dyer's School of Experience

[EDITOR'S NOTE.—*The following narrative is one of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* REPORTER *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* AMERICAN DYESTUFF REPORTER, *90 William Street, New York City.*]

BLEACHING AND SOUPLING ITALIAN YELLOW GUM SILK YARN

By NOEL D. WHITE

Davenport Hosiery Mills, Chattanooga, Tenn.

SOME years ago I was working in a small city in western New York in a dyehouse attached to a large ribbon mill that has since ceased operation.

In this place we dyed silk and cotton. Silk was by far the largest production. We had to dye pure dye bright organ, tram and also loaded silk and quite a lot of souple tram. Loading for bright silk was carried on with bichloride of tin in the usual way, the souple silk was dyed in a broken soap bath and loaded with a glucose solution in the way explained in a previous article.* This is the way my boss, we will call him Mr. K., used to make the tram souple. The silk was usually a three-threads strand of Japanese silk. The lot was scoured in a bath of 6 per cent olive oil soap and 3 per cent sal soda at 90° F. to wash out all throwster softeners and to clean oil spots that may have been in the silk; then it was rinsed and put in a dyeing bath of broken soap soured with sulphuric acid and boiled at least three times during the dyeing at the end of which the color was generally to pattern and souple enough. After the lot was washed and wrung out, whizzed in a hydro-extractor, it was sent to be passed in the sugar loading solution, then put in the dry room. When dry the finishers gave it the necessary softness by stringing it, a handful at a time, with a hand pin, an operation familiar to all silk skein dyers of a generation ago, which was a strenuous muscle-building performance in those days, but is now done mostly by machinery.

One day a lot came in that instead of being white Japan was yellow Italian silk and it had to be soupled and dyed a light blue. Mr. K. was quite upset about it. He wanted to send it back and demand white silk for that job, but that was all the silk the mill had on hand and they had ordered him to dye that. So he set to work to do it.

I must explain here that in this place I was a dyer among several others and had nothing to do with preparing the silk. All I did was to take the samples the boss gave me, look for the lot to dye and go ahead; he had other people to prepare the silk and give out the lots.

That morning I could see the boss was worried about something, but I had no idea what was troubling him until I saw him enter our department with a handful of silk that looked like boiled-off, but of an unusual yellowish tint. As I happened to be headed for the finishing room, I followed him, and when he saw me he gave me that handful of silk and said: "White, look at that silk and tell me what you think about it. They gave me yellow Italian silk to be dyed souple sky blue; it cannot be done. I told them so. They don't believe it, but I know better. This is what I got."

I took it and looked at it. It was partly boiled-off, that is, part of the skein; the outside part looked like some snails had crawled across it and left a shiny track over it in spots. I asked him if the whole lot was like that and what he had done to it. He replied that it was all like that and all he did was to follow some information he had dug out of some technical book. He had gathered from this book that to souple yellow silk the gum had to be only partly removed by working in a boiling soap bath with from 5 to 6% of olive oil soap. I had been told that this man had taken the job of managing the dyehouse when he had but a smattering knowledge of silk dyeing. As he had the power of hiring the needed help, he had until this time hired good dyers from whom he had learned little by little what he could, had succeeded so far, and was now on his tenth year in this position; but he had never until this time faced a proposition of this kind. Now he was up against it and did not know how to extricate himself. He had at home the largest technology library in the village, but thirty years ago there was not much written about processing silk in a practical way. At least, not much that I know of and I have always been some book-worm myself.

At any rate, here was a chance for me to show my boss that I knew a thing or two about silk processing. First, I told him that if he wanted to save that silk he had better give it a thorough boiling-off because in that condition he could never make a souple out of it any more; then he could get another lot and I would

*American Dyestuff Reporter, July 11, 1927.

show him I could souple a lot of silk and dye it a sky blue, even if it was yellow Italian.

"Do you really believe you can do it?" he asked doubtfully.

"Mr. K. I don't believe it, I know, because I learned years ago how it is done. But it cannot be done in boiling soap, no matter how weak the soap is."

"I will get the silk; you go to it and show me."

What he saw when I got through with my lot was a revelation to him. As we had no sulphur chamber we had to improvise one, but we dyed that silk to his complete satisfaction.

Before I proceed any further to narrate how we did that work I must explain what prompted me to make this the subject of this article.

Some time ago I called at the office of a dyestuff salesman. Before I left he showed me a book he had just received, saying it was the best book on dyeing he had ever seen and advised me to get one.

It was "Application of Dyestuffs," by J. Merritt Matthews.

I looked through the pages, read a few items and thought it was a good addition to my little library, so I told him to order one copy for me.

In due time the book came and I went about reading it from time to time. Except for a lot of technical matter, very good for students, I found that I was acquainted in a practical way with nearly all the material in it, and many things I had forgotten were brought to mind. I was pleased with my purchase. I could now go to it when I needed brushing up on something. One day I thought I would see what there was in that book about boiling off, bleaching and processing silk in general. I found a paragraph that was a surprise to me. Pondering over it brought to my mind the experience just related, but Mr. K. could not have gotten his instructions from the same book because this book was printed in the year 1920, and that occurred nearly twenty years earlier, but it must have been from some other writer giving theories or results from laboratory experiments which in practice could not possibly work, like the paragraph I had just read.

Here is the paragraph in question as written on page 99: "Souple silk is produced by boiling in a weaker soap solution than when boiled-off silk is desired; also only one treatment is given and the time of boiling is reduced. The amount of silk glue removed may also be regulated by scouring at temperatures lower than the boiling point."

It is surprising to me that in a book of that kind, so accurate in all other respects, apparently, such a statement should be allowed to appear and remain there. That statement is wrong in principle, it cannot be applied to practical work. Soupled silk cannot be obtained by a partial boiling off. That is an operation that can not be done partially on silk. The glue has to be completely removed by boiling-off or left on the silk and made use of in processing for ecru or souple. In the latter case if the gum is white the silk is scoured in lukewarm soap and soupled by boiling in cream of tartar, tartaric acid, sulphuric acid or a mixture of any two of them; and in case of yellow silk, it is scoured same as for white silk, then bleached white by the use of nitrous acid produced by the action of sulphuric acid upon sodium nitrite or with *aqua regia* and stoving in a sulphuric dioxide chamber and then soupled the same as for white silk.

As I am told that the book I mentioned is used as a textbook in at least one of the leading textile schools in the country, the sooner it is revised the better it will be for the students.

But to return to my story, this is how we went about to souple and dye that lot of yellow silk to a sky blue:

The lot was scoured in a lukewarm soap and soda bath, as mentioned above, then rinsed and put into an *aqua regia* bath. We mixed 2 quarts of nitric acid and 4 quarts hydrochloric acid, added one-half of it to about 400 gallons of water, entered the goods and gave them one turn; then put in the rest of the acid solution and gave the goods four more turns slowly; then we rinsed them in two cold waters and wrung them out by hand.

As we had no sulphur chamber we devised one by using an old rectangular tank fitted up with laths on the inside to hold up the silk, pegging some cleats around within an inch of the top of the vat to insert a cover made of matched boards to insure an air-tight chamber; we plastered all crevices with spent fuller's earth made into a paste with water. When everything was ready and the goods hung in the tank, we put in a corner of the tank an iron kettle, like the one grandma used to fry doughnuts, put in the kettle 5 pounds of sulphur sticks (brimstone) well broken up, dropped in a piece of red hot iron grate to light the sulphur and closed up the tank. In the morning we added more sulphur to the kettle, lighted up again and closed as before.

In the afternoon we aired the tank, took the goods out, washed them in cold water and soaped them lukewarm. Then we put them back into our improvised sulphur chamber until morning.

When we took the silk out in the morning we prepared a bath with 5% cream of tartar, and without washing the sulphur out we put the silk in this bath at the boil for one-half hour, then lifted it on racks, boiled the bath and set the goods in again for another half hour, at the end of which time the lot was as soft and white as necessary to be dyed any light color.

That day one of the dyers came to me and told me what a fool I was to show the boss something he did not know. He said he had learned all he knew about dyeing silk from fools like me, who were fired after he had learned from them all they had. I could see the reason in his argument, but I told him if I lost

my job I could find another one easier than the boss could; but I did not lose the job, not for a long time. When I left that place it was to go to a bigger position I secured through the efforts of Mr. K.

I also convinced Mr. K. of the futility of loading souple silk dyed in dark colors like navy, brown, green, etc., with sugar when it could be done easier in the same bath while dyeing by using sumac, or tannic acid, and I am sure I never felt sorry for doing it, but felt satisfied in the consciousness of being of help in improving the works.

RECENT LITERATURE

Garment Dyeing and Cleaning. By the Editors of the Laundry Record and Dyeing and Cleaning Trade Journal. Illustrated. 191 pages. London: Heywood & Co. 15/-.

IN the preface to this highly useful little volume it is stated that the authors have been encouraged to issue it by the "comparative dearth of literature dealing with the subject," and because of the marked development of the dyeing and cleaning trade (in England) during the past few years. The same reasons should make the book of even greater interest to the garment dyeing and cleaning industry of the United States.

The text of the book represents an attempt to treat the subject from the most practical angle. Some phases of the subject, in fact, are treated in a somewhat elementary manner on the assumption, no doubt, that few members of the cleaning and dyeing trades can boast of an advanced technical education. This assumption would, we believe, hold true also in this country, where facilities for educating cleaners in the technicalities of their vocation have only recently been established.

The two main divisions of the subject, i. e., garment dyeing and dry and wet cleaning, are treated separately, with greater space devoted to dyeing, admittedly the most difficult branch of the trade. The section on dyeing endeavors to be as complete as almost any reader's requirements would call for. With introductory chapters on the importance of good water in processing and on scouring and stripping, this section deals with the dyeing and finishing of practically every article of apparel in general use to-day as well as with carpets and rugs. A lengthy chapter on rayon and pure and weighted silk garments is evidence of the distinctly modern slant taken by the book in its treatment of the subject. The concluding chapter of the section describes the chemicals used by the garment dyer and various methods of identifying textile fibers and testing dyes.

The section on cleaning is largely an exposition of modern dry-cleaning methods with a single chapter on wet cleaning. The detailed account of the spotting process should be of particular interest to uninformed dry-cleaners. One unusual feature of the volume is the selection of queries and answers on dyeing and cleaning comprising the last chapter, these having been selected from the columns of the Laundry Record. They treat of special cleaning and dyeing problems. A copious index is another important feature. Several of the halftone illustrations are not very clear, but these in most cases are of minor importance to the text.

Uses of Research in Developing Old Products and Introducing New Ones. No. 1 of a Series of Reports on Applying Research to Production. Prepared for the Research Committee of the New England Council by the Metropolitan Life Insurance Company, New York. 16 pages.

LIKE the little girl who dreamt she had a brand new dress made out of her grandmother's old one, New England manufacturers are awakening to the great possibilities in scientific research for developing established products as well as introducing new ones. "The Use of Research in Developing Old Products and Introducing New Ones" contains numerous specific examples of just how this is being accomplished.

Applying research to the problem of developing products is a comparatively recent move, according to the data obtained during a six-month survey of New England industries which preceded the issuing of this booklet. Most factories carry on some activities for improving their products, it was found, but few maintained experimental laboratories or formal research departments.

One or two specific cases will exemplify how products have been improved. The Max Ams Chemical Engineering Corporation of Bridgeport, Conn., builds equipment for the manufacture of rayon by all processes. In its efforts to develop and perfect this equipment the company maintains an experimental plant in which rayon is actually manufactured on a semi-commercial scale, and where processes are studied and improved and chemists and engineers trained as operators. In addition, chemical and mechanical research laboratories are maintained for carrying out various experiments with cellulose.

While spruce pulp is generally used for the manufacture of rayon, the research laboratories of this company have produced rayon from cellulose derived from various other sources. The laboratories are in constant touch with the industry and aim to improve machinery and processes through experiment and development. Every effort is made to design machines that can be run by comparatively unskilled operators. Particular stress is laid on the gathering of authentic data with respect to cost of production of rayon and methods for improving the tensile strength of the products in its dry as well as wet state.

New developments have been worked out to short-cut

the process in the manufacture of rayon wherever it is possible without deteriorating the final product. Very fine yarns are becoming more popular, and for the past year an experimental plant has been engaged in the manufacture of such fine yarns by the viscose process.

A canning company through its research laboratory discovered a substitute for solder for joining tops to metal cans, an improvement which has been a material factor in the growth of the canning industry.

These are only two illustrations described in this report which is the first of a series on the more general subject of "Production Research." Those to be issued later are: "Standardization and Simplification" and "Bettering Production Methods Through Research." Copies may be had on request from the Policyholders' Service Bureau, Metropolitan Life Insurance Company, New York City.

Getting Facts About Accidents. Policyholders' Service Bureau, Metropolitan Life Insurance Company, New York. 23 pages.

"Getting Facts About Accidents" is the second of a series of publications issued by the Policyholders' Service Bureau of the Metropolitan Life Insurance Company, presenting the basic principles of successful industrial safety work.

Addressed primarily to the chief operating official, it outlines current industrial practice in obtaining and using accident facts as a means of promoting plant safety. It presents convincing evidence of the value of accurate knowledge, concerning how and where accidents occur, on the part of those executives charged with responsibility for keeping informed of the weak spots in the organization and of this cause of excessive production costs. Accident forms are provided, which have been found helpful in recording the necessary facts and making them available for study. There is also given a description of methods by which this information may be put to maximum preventive use.

Copies of "Getting Facts About Accidents" may be obtained by those interested in the subject of accident statistics by addressing the Policyholders' Service Bureau of the Metropolitan Life Insurance Company.

Polytechnic Institute of Brooklyn—Seventy-third Annual Catalog of the College of Engineering and Bulletin of the Evening Session of the College of Engineering. 1928-1929.

Students seeking courses of higher education in chemical engineering and general chemistry and all related subjects, will find these two bulletins of considerable interest in planning their academic program for the coming fall and winter seasons. All courses are fully described, and groups of courses leading to degrees clearly scheduled. A description of the college's laboratory equipment and other general information on student organizations, etc., are included.

SUPPLEMENT TO MELLON INSTITUTE LITERATURE ISSUED

A list of the books, bulletins, journal contributions and patents by members of Mellon Institute of Industrial Research during the year 1927 has been issued by the Institute as the first supplement to Bulletin 2. Among the books listed is the excellent volume published last year by Harper & Bros. entitled "Textile Fabrics; Their Selection and Care from the Standpoint of Use, Wear and Launderability," by George H. Johnson, of the Laundryowners' National Association. A number of journal contributions on laundering by Mr. Johnson are also indexed, as well as several by Lloyd Jackson on dry cleaning and mothproofing. These are all of interest to textile chemists.

Copies of this supplement may be obtained by chemists, librarians or teachers by writing directly to Mellon Institute, University of Pittsburgh.

WHAT PRICE RAYON IN THE WASH?

The increasing use of rayon for underwear, particularly for men's apparel, has presented several new problems to the laundries. No general policy seems to have been established by the laundry industry in the matter of charging for rayon garments as distinct from apparel of other material.

The Department of Commerce recently sent out a questionnaire to Washington, D. C., laundry owners for the purpose of determining comparative charges for laundering men's cotton or rayon underwear, and methods of handling the latter in the plant. Men's rayon underclothing is being pushed aggressively at present, and the huge quantities now seen on the market indicate that the laundries are going to be called upon to handle many of these rayon garments.

The following facts were brought out by the questionnaire: Three-fourths of the laundries charge from 75 to 100 per cent more for laundering the rayon garment than for the cotton; the remaining laundries charged the same price for underclothing of either fiber. The laundries washed these goods by hand with the exception of one, where use was made of a small "jiffy" wheel. Some of the plants commented that no appreciable quantities of these rayon garments had as yet been encountered, and that no policy had yet been decided upon.

The textile industry, ranking among the highest and most important industries in the United States, should have more representation at the annual Safety Congresses, says the Textile Section news letter of the National Safety Council, referring to the next congress to be held in New York, October 1 to 5.

George W. Bickel has resigned his position as fixer in the finishing department of the Century-Beverly Corporation, Pottstown, Pa.

RECENT PATENTS

Dyeing Cellulose Acetate

According to British Patent No. 262,357, taken out by the I. G., fast dyeings are produced on cellulose acetate by saturating it with a solution which contains a coupling component and a nitrite. The goods, which have been wrung out but are still moist, are then treated with a solution of a salt of a diazotizable base, or they may be treated with a mixture of a diazotizable compound, a coupling component and a nitrite, in some cases with further additions, usually in hot solution or in suspension. The dye is then produced on the material, which has been wrung out, by treating it with an acid salt or by printing the goods with a mixture of a diazotizable compound, a coupling component and a nitrite, and producing the dyestuff by an acid solution.

A further patent (No. 287,651) is applied to hairs, furs and pelts, as well as to cellulose acetate. The goods are saturated in a bath containing a mixture of both azo components and the nitrite, and are not wrung out before the treatment with acid solution but are left in the bath, which is acidified.

It is an essential feature of this form of the improvement that a nitrite required for the subsequent diazotization is present during the absorption of the azo components by the material, since it has been found that this absorption is favored by the presence of the nitrite.

This form of the process is thus distinguished from the process of producing dyestuffs on the fiber of cellulose acetate with the use of a single bath, in which the fiber is introduced into a bath containing a diazotizable amine and a coupling component, and when absorption of these compounds by the fiber has gone far enough a solution of a nitrite and an acid is added.

If, in the dyeing of hairs, etc., two baths are used, the goods to be dyed, which have been saturated with this mixture, are wrung out centrifuged and then brought into an acid bath to which some nitrite is advantageously added.

To the bath may be added killing materials in order to degrease and purify the materials and make them receptive for the dyestuff. Also fiber protecting compounds can be used.

Instead of, as in the former patent, printing a thickened mixture of the azo-dyestuff components and nitrite and after drying the goods developing by the action of an acid salt, the diazotizable compounds may be omitted from the printing color and the goods after drying may be treated with a solution of a salt of a diazotizable base; or the fiber may be saturated with a solution which contains a coupling component, a nitrite, and, in some cases, the usual additions, and, preferably after the fiber has been dried, printed with a diazotizable amino compound in the form of a salt, with addition of an organic acid.

If the solution in which the goods have been saturated also contains both a coupling component and a diazotizable component or a compound such as metadiamine of the benzene series, which serves both as a coupling component and as a diazotizable component, it is only necessary to print an acid medium to which the necessary nitrite has been added in order to produce the dyestuff on the fiber. In this case organic acids are particularly suitable.—Dyer and Calico Printer.

Color Printing on Immunized Cotton

British Patent No. 261,399, taken out by Etablissements Petitdidier, Saint Denis, specifies an improved process for color printing on fabrics essentially composed of immunized cotton, and having ordinary cotton, silk or artificial silk as a backing.

The process is based on the particular properties shown by immunized cotton as compared with those of other fabrics as regards their respective reactions in the presence of:

1. The amina oxy, the diamino, tetramino, methylamine, dimethyldiamino anthraquinones or colors for cellulose acetates.
2. Acid colors having an affinity for immunized cotton such as citronine, rocceline and solid blue for silk.
3. Basic colors in conjunction with tannin or Acetanol.

The fabric is printed in the usual way with these colors. It is then fixed by steaming, the colors becoming fixed on the fibers of immunized cotton but only incompletely on the cotton or viscose backing. The fabric is then rinsed, a part of the colors with which the cotton backing and the viscose are impregnated disappearing. The material is finally immersed in a solution of 1 gm. hydrosulphite per liter of water at 75° C. All parts of the fabric other than the immunized cotton are discolored. The fabric may be utilized in this condition or it may be subjected to a dyeing process, which acts on the cotton backing without appreciably modifying the coloration of the immunized cotton.—Dyer & Calico Printer.

United States Patents

Yellow Vat Dyestuff. (Treating certain anthraquinone anthrimids with concentrated sulphuric acid.) Sebastian Gassner, of Leverkusen, near Cologne, Germany, assignor to Grasselli Dyestuff Corporation, New York, N .Y. No. 1,667,848; May 1, 1928.

Manufacture of Water-Soluble Ester-Like Derivatives of Vat Dyestuffs. (Treating a leuco compound of a vat dyestuff with the chloride of pyrosulphuric acid in presence of an organic base.) Wilhelm Bauer,

of Wiesdorf, near Leverkusen, Germany, assignor to Durand & Huguenin S. A., of Basel, Switzerland. No 1,668,392; May 1, 1928.

Process of Softening Fibers of Cellulose Origin with a View of Facilitating Their Esterification. (Combining with action of vapors of acetic acid the action of a small quantity of a halogen element.) Henri Louis Barthelemy, of Vercelli, Italy, assignor to Ruth Aldo Company, Inc., of New York, N. Y. No. 1,668,483; May 1, 1928.

Process for the Preparation of Cellulose Acetate. (Comprising modifications of the acetylations so as to produce and insure superior physical characteristics.) Henry Louis Barthelemy, of Vercelli, Italy, assignor to Ruth Aldo Company, Inc., New York, N. Y. No. 1,668,485; May 1, 1928.

Process for the Manufacture of Phenyl Glycine or Compounds Thereof. (From trichlorethylene and aniline without isolating any intermediates, and without using alcohol as solvent.) Georges Imbert, of Manchester, England, assignor to British Dyestuffs Corporation, Ltd., London, England. No. 1,668,964; May 8, 1928.

Production of Azo-Dyestuffs Containing Two Hydroxynaphthalene Nuclei. Fritz Straub, of Basel, and Hermann Schneider, of Riehen, near Basel, Switzerland, assignors to the Society of Chemical Industry in Basle, of Basel, Switzerland. No. 1,669,069; May 8, 1928.

Process for Converting Cyannaphthalene-Sulphonic Acids. (Important intermediates for production of dyestuffs and pharmaceutical products by treatment with caustic alkali in presence of n-butylic alcohol.) Richard Herz and Fritz Schulte, of Frankfort-on-the-Main, Germany, and Werner Zerweck, of Fechenheim, near Frankfort-on-the-Main, Germany, assignors to Grasselli Dyestuff Corporation, New York, N. Y. No. 1,669,297; May 8, 1928.

Phenol Resin and Method of Making the Same. (Adding alkali to a mixture of formaldehyde and a phenol boiling about 202° C.) Charles J. Romieux, of Elizabeth, N. J., assignor to American Cyanamid Company, of New York, N. Y. No. 1,669,674; May 5, 1928.

2-Amino-4-Nitrophenoxyethanol and Process of Producing the Same. (Treating 2.4-dinitrophenoxyethanol with an alkali sulphide as reducing agent.) Oscar Knecht, of Binningen, near Basel, Switzerland, assignor to Chemical Works formerly Sandoz, of Basel, Switzerland. No. 1,669,764; May 15, 1928.

Process for the Preparation of Emetine. (Consisting in methylating cephaeline with phenyltrimethylammoniumhydroxide.) Ernst Burckhardt and Max Starkle, of Basel, Switzerland, assignors to the firm: Chemical Works formerly Sandoz, of Basle, Switzerland. No. 1,670,059; May 15, 1928.

IMPREGNATION IMPROVES RAYON WET STRENGTH

One of the most persistent objections advanced not only by technical men but also by the public against rayon is the weakness of the artificial fiber when wet. The problem of increasing the strength of fabrics has assumed a leading place in many of the researches conducted on rayon, and it is encouraging to report that advances toward a solution have been made.

In discussing the developments made during the past few years in the manufacture of stronger rayon, the Bureau of Standards says:

"Although it is rather difficult to estimate the improvement in the strength of rayon quantitatively, there is no doubt that considerable improvement has occurred during the past few years in both the wet and dry strength of rayon. Part of this improvement has been due to better raw material. The remainder is no doubt due to improved methods of manufacture.

"Some work has also been done in the rayon field on impregnating the fiber to improve the wet strength. One method provides for treatment with a solution of alum, lactic acid and formaldehyde, then partially dried and treated with a Marseilles soap solution, after which it is rinsed and dried."

TEXTILE SCHOOL AT NORTH CAROLINA CLOSES SUMMER SESSION

The summer session of the textile school of North Carolina State College, which closed on July 20, was quite successful, it is declared by Dean Thomas Nelson. Regular classes were conducted in yarn manufacturing, weaving, designing and fabric analysis. In addition to regular college work, two special classes were conducted for men who were taking the cotton grading course and for women teaching home economics.

The prospects for the fall session are very encouraging, it is stated, as a number of applications have been received from North Carolina and other States. In addition to the regular courses in textile manufacturing and textile dyeing, the school offers a special course for university and college graduates, and several applications have been received for this course. Other young men who have been attending academic institutions will enter the textile school with advanced standing, and judging from present prospects the freshman class will be larger than it has been in several years.

The headship of the new Artificial Silk Department at the Shirley Research Institute of the British Cotton Industry Research Association has been offered to and accepted by Dr. Harold Hunter, D.Sc., F.I.C., of the Battersea Polytechnic Institute, London.

Technical Notes from Foreign Sources

Printing Upon Acetate-Silk Mixed Weaves

Dr. Erich Heim, Zeitsch. fuer Farbenindustrie, 64, 20 (1928).—Early fears as to the impracticability of utilizing acetate silk, because of its slight affinity for the usual dyestuffs, has vanished, and the valuable properties of the fiber, its luster, its uniformity of size, and its slight degree of swelling when wet, and consequently its greater strength when in that condition, have made it specially valuable for incorporating into mixed weaves. Such weaves are classified as follows: (1) Acetate silk and vegetable fiber; (2) Acetate silk and animal fiber; (3) Acetate silk with both vegetable and animal fibers. The author discusses methods of printing (general) under these three heads:

(1) *Acetate Silk Plus Cotton.*

(a) Printing with substantive dyestuffs, such as Sirius Rose G; the cotton is dyed, the acetate silk undyed.

(b) Printing with acetate silk dyestuffs, such as Cellitone Fast Rose B; the cotton remains white, the acetate silk is dyed.

(c) Printing with a paste containing a substantive dyestuff and an acetate silk dyestuff, for example, Cellitone Fast Violet B and Sirius Brown R; the cotton is printed brown, the acetate silk violet, where printed.

(2) *Acetate Silk Plus Wool or Silk*

Here the printing is done with selected acid dyestuffs, which do not dye acetate silk. In this group, as in (1), discharge printing may also be resorted to.

(3) *Acetate Silk Plus Cotton and Wool or Silk*

In this group the methods of (1) and (2) may be combined without limit, only there is a greater danger of some of the colors coming out not clear. One may, for example, dye in a bath containing a substantive dyestuff and an acetate silk one (for reserves on the silk some Katanol W is added to the bath) and then print with a paste containing either an acetate silk and a substantive cotton dyestuff, or an acetate silk and an acid dyestuff, or an acetate silk, an acid, and a substantive dyestuff. (In the latter case Katanol W must again be added to protect the silk from the substantive dyestuff). Fancy effects of unique kinds are thus produced.

Dyeing of Straw

Dr. Adolf Gebhardt, Zeitsch. fuer Farbenindustrie, 71, 20 (1928).—A very thorough discussion of the bleaching and dyeing of straw, with several detailed recipes. An article of 5¼ pages, of which an abstract can hardly be given without its becoming practically a verbatim translation.

Cellulose Lacquers

S. Smith, J. Soc. Dyers and Col., 106, 44 (1928).—A lecture before the London Section of the society. Although not directly connected with the dye industry, a summary of the paper may be of interest to some.

The components of these lacquers, so much used at present for automobile finish in the United States, are various cellulose nitrates, resins, and solvents and diluting agents. Low viscosity nitrated cotton and a large list of suitable solvents account for the sudden and enormous increase in the lacquer industry. The nitrated cotton is chiefly made from cotton linters purified by boiling in caustic soda solution under pressure. The nitration of the substance takes place by the "displacement method," about 35 pounds of cotton being treated at one time with about 1,600 pounds of the nitrating acid. The type of nitric ester formed depends upon the composition of the acid mixture, the duration of reaction, and the temperature. The industries demand a certain percentage of nitrogen in the product, between 11.8% and 12.3% of nitrogen is most favorable for both lacquer and artificial leather manufacture. A suitable product will flow or spray easily even in a concentration of 22%, its viscosity being so low. The resins are necessary components of the finished lacquer, giving tenacity and body to it. Without a suitable resin, a film sufficiently tenacious could not be produced. Also, the resins are the cause of the desired gloss in the finished coating. In mixture with the cellulose nitrate, the dry film is tougher and more elastic than it would be if either the resin or the cellulose nitrate were omitted. Common rosin is the cheapest and poorest, but if used cautiously helps to bring up the total solid figure; dammar, sandarac, mastic and benzoin are the best. Dammar is the most popular at present; sandarac is used for the finest wood lacquers; benzoin is the best for metal lacquers and for the very finest work. Some of the newer synthetic resins are also used, and work well. The solvents are bewildering in number. Members of the alcohols, esters, ethers, aldehydes and ketones are used. Of these, the alcohols are not considered as solvents proper, but as "latent" solvents; i. e., their solvent properties, when used alone, are limited, but in mixture with other solvents they confer additional value upon the ordinary properties of these. Probably the acetic esters, methyl, ethyl, butyl and amyl, are most used and of greatest value. Ethylene glycol mono-methyl ether is a new solvent of great promise. The ketones, acetone and cyclohexanone are not actual solvents, but act half as solvents and half as plasticizers. In addition, benzene, toluene and xylene are useful as diluting agents.

Further, plasticizers are of value in preventing the

brittleness of film caused by too rapid evaporation of the solvent. Those principally used are castor oil, tricresyl phosphate and diethyl phthalate. They tend to make the film plastic and impermeable.

Pigments used are rather limited in number. Apart from the clear-tinted lacquers, which are colored with oil-soluble organic pigments, the ordinary lacquers are colored with earthy pigments. The lacquers are therefore properly paints. Some organic pigments, insoluble in the medium employed, are also used.

Action of Formaldehyde on Wool

S. R. Trotman, E. R. Trotman and J. Brown; J. Soc. Dyers, Col. 49, 54 (1928).—It has long been known that proteins react with formaldehyde to form insoluble condensation products of higher molecular weight, and also that through hydrolysis by acids or alkalies the protein molecule suffers degradation (breaking down in the chemical sense) to compounds of lower molecular weight and progressively less pronounced colloidal properties; this degradation following the course, protein-proteose-peptone-polypeptide-aminoacid. A reversal of the process is usually considered impossible, except in nature, although some of the steps have been traversed by a few workers, notably Fischer and Lepierre. The latter worker was apparently the first one in this field, and his syntheses took the form of condensation of proteoses (obtained by the action of enzymes on albumin) with formaldehyde, resulting in the formation of substances which might be regarded as simple synthetic true proteins. His work has apparently been overshadowed by the better-known syntheses of Fischer in the polypeptide group.

Since wool is essentially a mixture of proteins, its reaction with formaldehyde should follow the same course as simple proteins. The protective action against alkalies, brought about by treatment of wool with formaldehyde, may be due to the reaction studied by Lepierre. The degradation products of the wool, formed by the attack of the alkali, may be converted into more complex compounds, therefore less sensitive to attack by alkali, and redeposited on the wool fiber, or it may be that the wool itself contains as one of its constituents a proteose or meta-protein, which will react at once with formaldehyde to form the higher insoluble protein, while in the uncondensed state it would have solubility in alkali as one of its normal properties. Wool proteins are essentially amphoteric, and this has a certain bearing upon the reaction of formaldehyde upon wool.

From theoretical considerations, it appeared to be probable that the reaction between formaldehyde and wool ought to go to completion of the conditions allowed it, and the present study confirms this, as Gerngross has already done in the case of hide powder. The amount of formaldehyde taken up (chemically) reaches a maximum at 75° C. in three hours, being 0.70% on the weight of dry wool substance. Reaction is not complete at the ordinary temperature. The condensation product formed does not give up its formaldehyde on boiling with water as readily as does the similar compound formed in the case of leather. As to the properties of the treated wool, the authors find that the moisture content of the air-dried material is considerably lower than that of ordinary wool, about 11 to 12% as against 14 to 16%, and that in the case of wool treated with paraformaldehyde the difference is still more striking; 7 to 8% as against 13 to 14%. Also, the resistant properties of the treated wool toward alkali are greater in the case of formaldehyde than with paraformaldehyde, the efficiency with formaldehyde being nearly 100%. Formaldehyde wool has a lower shrinkage value when subjected to normal washing, but this property is lost after milling. There is no difference between treated and untreated wool in resistance to damage from chlorine. As to the affinity for acid dyestuffs, the formaldehyde-treated wool stands much lower, but the affinity develops on continued immersion in an acid dye bath, slowly in the presence of acetic acid, rapidly in the presence of sulphuric acid; in the latter case the wool becoming dyed as deeply as untreated wool, a fact due doubtless to the rapid hydrolysis of the formaldehyde wool compound by the mineral acid. The treated wool shows a remarkable degree of protection against the attack of bacteria; in the case examined (incubated with *Bacillus subtilis* at 37.5° C.) the treated wool remained unattacked even when the control sample of untreated wool had become completely disintegrated.

The authors are inclined to believe that the properties of formaldehyde wool are due primarily to an upsetting of the normal equilibrium mixture of enol-keto forms in favor of the former, and that this structure is more resistant to attack by acids and alkalies; and that the enol-form tends to revert to the keto-form with a rise in temperature, with a consequent reappearance of the properties of ordinary wool.

Dyeing of Acetate Silk

German Patent No. 444,961, *I. G. Farbenindustrie, A. G.; Dr. Hans Kessler and Dr. E. Doering.*—As is known, acetate silk can be dyed by many ordinary dyestuffs by ordinary methods only with great difficulty.

A method for overcoming this difficulty has been proposed, consisting in the addition of sulphocyanides to the dye bath, or in the pretreatment of the goods in a sulphocyanide bath. The amounts of sulphocyanide to be used are very large; their action depends upon the fact that in their presence the acetate structure swells and becomes capable of taking up dyestuffs of any class. The effect is the same, if one adds to the dye bath any organic solvents for acetyl-cellulose. The swelling and solvent action of concentrated sulphocyanide solutions is able to alter the consistency of the fiber even up to total loss of usefulness, while on the other hand the improvement of the affinity for dyestuffs is only slight, so that the dye-

stuff must be used in an extraordinarily high concentration of bath. A further disadvantage of the older process lies in the fact that basic dyestuffs are completely thrown out of solution by an excessive amount of sulphocyanides, and consequently the dye bath becomes merely a suspension of solid dyestuff, which does not penetrate into the fiber, but merely deposits superficially upon it, so that dyeings not fast to rubbing result.

It has, however, been found that by addition of small amounts of sulphocyanides to solutions of basic dyestuffs, compounds of the latter are obtained, whose solubility ratio between water and acetate silk is strongly displaced toward the cellulose acetate, without an actual precipitation of the dyestuff taking place or the physical properties of the acetate silk being disadvantageously affected. The dyestuff is taken up smoothly by the fiber, and fixed fully fast to rubbing. Only from 1 to 5 g. of sulphocyanide per liter of bath is required to attain the results mentioned, while according to the older method 100 to 200 g. were required. Since in practice it is not always possible to find exactly the most favorable amount of sulphocyanide to be added, the authors recommend an addition of protective colloids, to avoid the precipitation of any difficultly-soluble compounds which might be formed. Such colloids are already used in practice, in the dyeing of acetate silk with dyestuffs containing much salt, in order to hinder the salting out of the dyestuffs; in the present case, the use of high concentrations of salts does not come into question.

In the example given, acetate silk is dyed at 60 to 70° C. in a 1 to 20 bath which has been made up with 2% basic dyestuff (Vitoline Yellow, Safranine, or Fuchsine) and 1 to 5 g. ammonium sulphocyanide and 5 to 20 g. of glue per liter.

Dyestuff Preparations for Acetate Silk and Mixed-Weave Dyeings

German Patent No. 438,323; British Dyestuffs Corp., Ltd.—It has been found that, of all protective or dispersive colloids useful in the dyeing of acetate silk or of goods containing it, the condensation products of naphthalene with formaldehyde in sulphuric acid, or also of naphthalene sulphonic acids with formaldehyde, give the best results. By the use of these products new mixed products can be prepared, which enable the dyer to dye acetate silk and mixed goods containing it with great ease. These condensation products can be prepared according to the procedure of German Patent No. 292,531, but a more convenient method is described below in the example.

The new mixed products are obtained when finely divided dyestuffs, which possess affinity for cellulose acetate, and which are insoluble or nearly so in water, are intimately mixed with the naphthalene formaldehyde condensation products and sufficient water. There are thus formed dyestuff pastes which in the dye bath behave exactly as though the dyestuff is actually dissolved in the bath. The dyer does not need to use any special precautions, and can get for acetate silk a large range of color without being obliged to diazotize on the fiber and develop. The pastes can also be dried and preserved in the dry powder form. Direct cotton dyestuffs can also be added to the pastes in order to obtain mixtures which will dye at the same time fabrics which contain cotton and acetate silk. The dye bath may be neutral, slightly acid, or slightly alkaline, but not so much so as to saponify the acetate silk. Basic dyestuffs, which, as is known, form lakes with the condensation products, are unsuitable for this process, since these color lakes possess no affinity for acetate silk.

Example (preparation of the naphthalene formaldehyde condensation product according to German Patent No. 292,531).—Ten parts of naphthalene are sulphonated for 10 hours with 10 parts of sulphuric monohydrate, at 160° C. The product formed is diluted, under cooling, with 4 parts of water. Then, at 80 to 85° C., three parts of 40% formaldehyde are added, and the whole warmed for 6 hours at 90 to 100° C.; after cooling, the product is diluted with 6 parts of water, and partially neutralized with 6 parts of 38% caustic soda liquor.

To 10 parts of this dispersive compound, 100 parts of the dyestuff obtained from p-nitraniline and diphenylamine are gradually added, in a finely divided state, and thoroughly mixed. The mixture can be used at once by the dyer as an ordinary dystuff paste, e. g., to a dye bath containing cold water so much of the paste is added and well stirred in, that for 100 kilos of acetate silk to be dyed 1 kilo of the dyestuff is present. After thorough mixing, the well-wetted acetate silk is introduced, and as usual warmed to 70 to 80° C. Salt may be added to the bath if desired.

In a similar way dispersions or pastes can be prepared from the condensation products, and 1-4-diamino-anthraquinone or methyl-diamino-anthrarufine (see British Patent No. 211,720). By dyeing with these acetate silk is dyed violet or blue.

GERMANY EXPORTING MORE DYES

An increase is reported in the value of the dyestuffs exported by Germany during the first quarter of this year, according to advice received by the Department of Commerce from its Berlin office. The relatively slight increase in the weight of the dye exports compared with the marked advance in value, it is declared, indicates Germany's attempt to concentrate its efforts to regain at least a share of the markets lost during the war.

During the first quarter of the present year the total dyestuffs exports from Germany amounted to 13,358 tons, as compared with 12,928 tons during the corresponding period of 1927. The total value of these exports increased from 57,200,000 marks in the first quarter of 1927 to 63,706,000 for the same period of the current year.

JAPAN'S DYE INDUSTRY FACES CRITICAL PROBLEM

A conference held in Osaka, Japan, late in June by members of the Dyestuffs Industry Association of Japan is thought likely to have important results for the trade. Subjects taken up included how to compete with German dyestuffs, how to reconcile the interests of producers who are operating on different scales, and how to deal with imported finished dyes, intermediate dyes and raw materials.

The problem of dealing with German dyes is considered perhaps the most important. According to the Chugai Shogyo, a leading vernacular journal, the position of Japanese dyestuffs is growing more difficult with announcement of reduction in the prices in Japan of German goods of about 5 per cent in anticipation of an increase in importation under the agreement with Germany.

Unless adequate steps are taken in the early future, it is being said here, many private manufacturers, as opposed to those subsidized, will not be able to compete. What is desired is an increase in the number on the list of dyestuffs for importation and home manufactures, and increase in grants on the latter.

The Japanese dye industry, says this Tokio journal, faces a most difficult period, as "Germany is bent upon regaining her pre-war position in the chemical industry. Dystuffs are produced in excess of needs in the world market since the United States, Italy, France and other countries are encouraging their own industries behind protective tariff walls. The chance for the German industry is in the Far East, where the duties are not yet prohibitive.

"It seems that the German industry aims at control of the Japanese market. To what extent the Japanese industry can stand its ground depends in some measure on the iron, gas and soda industries."

As facilitating a satisfactory solution of the problem it is suggested that production be rationalized in those dyes which can be produced on a large scale, such as Indigo and Sulphide Black. Indigo is especially emphasized. Of this China consumers 3,000 tons a year, and the Mitsui Mining Company is confident of obtaining in four or five years a quality to enable it to compete with the German supply. This will be after a number of years of experimentation conducted at an expenditure of several million yen.

The opinion in the trade seems to be that the imminent danger may be removed with help from the Government and a larger production program.

"When the industry has attained a stage where it can stand on its feet, efforts should be made to create a market in China, India and the South Seas," says one comment in an English language journal.

SEPTEMBER MEETING OF AMERICAN CHEMICAL SOCIETY AT SWAMPSCOTT, MASS.

Indications are that more than two thousand chemists and scientists will attend the fall meeting of the American Chemical Society, September 10 to 15, at Swampscott, Mass., twelve miles from Boston. The members of the Northeastern Section will be hosts to the society.

Swampscott is one of the leading summer resorts in the Boston territory, ideally situated on the "North Shore." Visitors will enjoy the pleasures of a recreational week at the seashore as a background for the important scientific sessions. Both the scientific and entertainment programs will be of the highest order. There will be papers by international authorities. There will be trips to Marblehead, Salem, Gloucester, Lexington, Concord, Sudbury and other places of historic and present-day interest.

Registrations may be made at the two hotels chartered by the society and at the other hotels in and near Swampscott and Boston. The society has engaged the New Ocean House and the Hotel Prescott; headquarters will be at the first, the second will be used by members of the Rubber Division and others. The general chairman of the committee is Gustavus J. Esselen, Jr., 246 Stuart Street, Boston, Mass.

Joseph Bennett, general manager of the Windsor Print Works division of the Consolidated Textile Corporation, North Adams, Mass., has been re-elected president of the Employers' Association of Berkshire County, Mass. A. J. Buffum, treasurer of the Blackinton (Mass.) Company, was elected a vice-president and R. M. Ames, treasurer of the Pontoosuc Woolen Manufacturing Company, Pittsfield, Mass., treasurer.

Application was made to the Governor of Pennsylvania at Harrisburg for a charter for Bick & Co., capital $125,000, to manufacture dyes, soaps and chemicals. John D. Esterly, Sarah M. Oaks and Earle I. Koch are the incorporators. The company will operate a plant in Reading.

Leslie M. Brown has been appointed sales manager of the Tanning Oil Division of the National Oil Products Company, Harrison, N. J. Mr. Brown was formerly with the Radel Leather Manufacturing Company, Newark, N. J.

Walter Humphreys, secretary of the National Association of Wool Manufacturers, who is making a tour of the West, stopped in Salt Lake City and visited F. R. Marshall, secretary of the National Woolgrowers' Association.

NEW BUREAU REGISTERS SILK DESIGNS

With its chief aim to prevent duplication of designs in silk prints and to assist the silk industry to maintain a high standard of ethics in the prevention of copying, the Silk Association of America recently established a Design Registration Bureau.

This bureau will function in much the same fashion as the Trade Mark Registration Bureau, which has for the past fifteen years registered trade-marks and trade names for the textile industry. The new Silk Association bureau will enable the manufacturer to find out whether or not the design he intends to print has been previously used. For it has been the frequent experience of silk manufacturers that expensively engraved rollers have had to be scrapped before they were used because of the untimely discovery that their design was already in use in the trade.

Richard W. Arrington, superintendent of the Union Bleachery, Greenville, S. C., has been elected president of the Greenville Rotary Club for the coming year.

The American Glanzstoff Corporation has engaged Morris Phinney as manager of a new district office in Providence, R. I. Mr. Phinney was formerly with the Rayon Institute, having done some very valuable work as a textile expert.

A. M. Graves recently commenced his duties as overseer of finishing at the Everett-Norfolk Company, Lebanon, N. H., succeeding Harry F. Keenan, who recently resigned.

Reginald Reynolds has been appointed manager of the rayon thread department of the Belding-Heminway Company. Mr. Reynolds will have charge of the manufacture and sales branches.

Imperial Chemical Industries, Ltd., London, has offered to acquire the stock of the Welsbach Light Company, Ltd., on the basis of one share of its stock for two Welsbach and one I. C. I. deferred for twenty Welsbach. The Welsbach board has recommended acceptance of the offer, according to a cable from the Central News, London, to the New York News Bureau.

Hugh J. Molloy and Joseph A. Gagnon, Lowell, and Thomas J. Clark, Billerica, Mass., have been reappointed trustees of the Lowell Textile Institute.

J. H. Mayes, who has just been elected vice-president of the Fitzgerald (Ga.) Cotton Mills, will also be general manager of the Tifton Cotton Mills.

William S. Pedler, the oldest employee of the Pacific Mills, Lawrence, Mass., has resigned his position as foreman of the mechanical repair shop of the worsted department, after fifty-two years of service.

Whitworth Bird, of the Cranston Worsted Mills, Bristol, R. I., has been transferred to their experimental station in Philadelphia, where he will develop several of his inventions.

George A. Sloan, secretary of the Cotton-Textile Institute, has returned from a two weeks' vacation spent at the home of his family in Nashville, Tenn.

F. T. T. Reynolds has been compelled by ill health to resign as chairman of the British Chemical & Dyestuffs Traders' Association. He has been succeeded by A. F. Butler. Other officers elected late in June are: President, Victor Blagden; vice-president, F. T. T. Reynolds; vice-chairman and treasurer, S. J. C. Mason.

Thomas J. Eccles has resigned his position as overseer of dressing at the Aetna Mills, Watertown, Mass., to accept a similar position with the Princeton Worsted Mill, Inc., Trenton, N. J.

DYESTUFF SALESMAN

Experienced dyestuff salesman, well known by entire textile, leather, paper industries, etc., in territory covered by him for many years, offers his services to first-class manufacturing concern. A-1 references given. Address Classified Box 466, American Dyestuff Reporter.

EXPERIENCED CHEMIST AVAILABLE

Textile chemist with eighteen years' experience, eight years director of laboratory work, seeks position of responsibility in laboratory or in sales and demonstration work. Thorough knowledge of dyestuffs, application to various textile fibers, paper, leather, furs, etc. Age 32; married. Address Classified Box 472, American Dyestuff Reporter.

CHEMIST-COLORIST

Chemist-colorist with executive ability as partner in established dyestuff concern. Real opportunity for the right party. Investment $3,000 to $5,000. Must stand investigation. Address Classified Box 473, American Dyestuff Reporter.

DYER WANTED

Dyer, experienced in the dyeing of straw braid, wanted by a representative straw hat manufacturing company. Address Classified Box 474, American Dyestuff Reporter.